Draft Development Fees, Infrastructure Improvements Plan and Land Use Assumptions

for Police Facilities, Fire Facilities, Street Facilities, and Park & Recreational Facilities

Prepared for:

City of Tempe, Arizona

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EXECUTIVE SUMMARY

Under authority of Arizona Revised Statutes (ARS) 9-463.05, municipalities in Arizona may assess development fees to offset infrastructure costs to a municipality associated with providing necessary public services to development. The development fees must be based on an Infrastructure Improvements Plan (IIP). This draft of Tempe's IIP and development fees includes the following necessary public services:

- Police Facilities
- Fire Facilities
- Street Facilities
- Park and Recreational Facilities

The City of Tempe hired TischlerBise to document Land Use Assumptions (LUA), compile an IIP, and prepare development fees to comply with ARS 9-463.05. The IIP for each type of infrastructure is in the middle section of this document and the land use assumptions may be found in Appendix C.

Development fees are one-time payments used to construct system improvements needed to accommodate new development. The fee represents future development's proportionate share of infrastructure costs. Development fees may be used for infrastructure improvements or debt service for growth-related infrastructure. In contrast to general taxes, development fees may not be used for operations, maintenance, replacement or correcting existing deficiencies.

Arizona Development Fee Enabling Legislation

During the state legislative session of 2011, Senate Bill 1525 was introduced which significantly amended the development fee enabling legislation. This draft of Tempe's development fee study complies with all of the requirements of SB 1525. Key changes to the enabling legislation included:

- Development fees based on adopted land use assumptions and IIP
- Revised adoption procedures
- Specific definitions for "necessary public services"
- Time limitations for fee collections and expenditures
- Requirements for credits, "grandfathering" rules, and refunds.

Necessary Public Services

According to Arizona's development fee law, fees may only be used for construction, acquisition, or expansion of public facilities that are necessary public services. "Necessary public service" means any of the following categories of facilities that have a life expectancy of three or more years and that are owned and operated on behalf of the municipality: water, wastewater, storm water, drainage and flood control facilities, library, street facilities, fire and police facilities, neighborhood parks and recreational facilities.

Infrastructure Improvements Plan

Development fees must be calculated pursuant to an Infrastructure Improvements Plan (IIP). For each necessary public service that is the subject of a development fee the IIP shall include:

- Description of the existing necessary public services in the service area and the cost to upgrade, update, improve, expand, correct or replace those necessary public services to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards
- Analysis of total capacity, level of current usage and commitments for usage of capacity of the existing necessary public services

- Description of all or the parts of the necessary public services or facility expansion and their costs necessitated by and attributable to development in the service area based on the approved land use assumptions, including a forecast of the costs of infrastructure, improvements, real property, financing, engineering and architectural services
- Table establishing the specific level or quantity of use, consumption, generation or discharge of a service unit for each category of necessary public services or facility expansions and an equivalency or conversion table establishing the ratio of a service unit to various types of land uses, including residential, commercial and industrial
- Total number of projected service units necessitated by and attributable to new development in the service area based on the approved land use assumptions and calculated pursuant to generally accepted engineering and planning criteria
- Projected demand for necessary public services or facility expansions required by new service units for a period not to exceed ten years
- Forecast of revenues generated by new service units other than development fees, which shall include estimated state-shared revenue, highway users revenue, federal revenue, ad valorem property taxes, construction contracting or similar excise taxes and the capital recovery portion of utility fees attributable to development based on the approved land use assumptions and a plan to include these contributions in determining the extent of the burden imposed by the development.

Qualified Professionals

Qualified professionals must develop the IIP using general accepted engineering and planning practices. A qualified professional is defined as "a professional engineer, surveyor, financial analyst, or planner providing services within the scope of the person's license, education, or experience" (see ARS 9-463.05 T.8.). TischlerBise is a fiscal, economic, and planning consulting firm specializing in the cost of growth services. Our services include development fees, fiscal impact analysis, infrastructure funding, user fee and cost of service studies, capital improvement plans, and fiscal software. TischlerBise has prepared over 800 development fee studies over the past 30 years for local governments across the United States. Some of the IIP requirements discussed above add the phrase "prepared by qualified professionals licensed in this state, as applicable." Most states do not have license requirements for planners but recognize the membership requirements of the American Institute of Certified Planners (AICP). All TischlerBise Principals are AICP members.

Summary of Preliminary Development Fees

Development fees for necessary public services must be based on the same level of service provided to existing development in the service area. There are three general methods for calculating development fees. The choice of a particular method depends primarily on the timing of infrastructure construction (past, concurrent, or future) and service characteristics of the facility type being addressed. Each method has advantages and disadvantages in a particular situation, and can be used simultaneously for different cost components. Reduced to its simplest terms, the process of calculating development impact fees involves two main steps: (1) determining the cost of development-related capital improvements and (2) allocating those costs equitably to various types of development. In practice, though, the calculation of development fees is complicated due to many variables involved in defining the relationship between development and the need for facilities within the designated service area. The following bullet points summarize three basic methods for calculating development fees and how those methods can be applied.

- Cost recovery is used in instances when a community has oversized a facility or asset in anticipation of future development. This methodology is based on the rationale that new development is repaying the community for its share of the remaining unused capacity.
- Incremental expansion method documents the current level of service for each type of public facility. The intent is to use revenue collected to expand or provide additional facilities, as needed to accommodate new development, based on current infrastructure standards.
- Plan-based method utilizes a community's IIP and/or other adopted plans, or engineering studies, to determine capital improvements needed to serve new development.

A final consideration addressed in development fee studies and ordinances are "credits". These include a "revenue credit" due to possible double payment situations, which could occur when other revenues may contribute to the capital costs of infrastructure covered by the development fee. This type of credit is integrated into the fee calculation, thus reducing the fee amount. The second type of adjustment is a "site-specific credit" or "developer reimbursement" for dedication of land or construction of system improvements. This type of credit is addressed in the administration and implementation of the development fee program. For ease of administration, TischlerBise normally recommends developer reimbursements for system improvements.

Figure 1 summarizes the methods and cost components for each type of infrastructure included in Tempe's draft IIP and development fee study. A 2014 study by Arcadis addressed Tempe's need for water and wastewater facilities and applicable development fees.

Figure 1: Service Areas, Methods, Cost Allocation and Infrastructure Components

Type of Fee	*Service Area*	*Incremental Expansion (present)*	*Plan-Based (future)*	*Cost Allocation*
Police Facilities	Citywide	Police Buildings		Functional Population and Inbound Vehicle Trips to Nonresidential Development
Fire Facilities	Citywide	Fire Stations and Apparatus		Calls for Service, Residents and Jobs
Street Facilities	Citywide and North Tempe		Intersection Improvements, Transportation Systems Management, Bus Pullouts and Streetcar	Vehicle Miles of Travel, Functional Population and Jobs
Park and Recreational Facilities	Citywide and North Tempe	Park Improvements, Community Centers and Multi-Use Paths		Daytime Population and Jobs

Preliminary development fees are shown in Figure 2. Although Arizona law requires a two-step adoption process, whereby the IIP and LUA are approved first, followed by a second round of public input prior to adopting the development fees, stakeholders generally prefer to know the preliminary development fees based on the proposed IIP and LUA. Also, TischlerBise encourages communities to have a realistic funding strategy in order to make wise decisions on the infrastructure improvements plan. In recognition of the complexities and options for funding major improvements, Figure 2 provides two alternatives that vary the amount of development fee funding for Tempe's streetcar. Additional details on these alternatives are provided in the Street Facilities IIP section of this document.

Baseline is the boundary between Tempe's North and South Service Areas. For parcels with frontage on Baseline, the lower fee will be imposed on both sides of the street. Preliminary development fees are higher in North Tempe because new development will pay for additional improvements (i.e. multi-use paths and streetcar) that do not have a citywide service area.

Figure 2: Preliminary Development Fees

North Service Area - Alternative A	*Police Facilities*	*Fire Facilities*	*Street Facilities*	*Park and Recreational Facilities*	*TOTAL*
Residential (per housing unit by square feet of living space)					
900 or less	$245	$217	$759	$406	$1,627
901 to 1400	$403	$356	$1,225	$664	$2,648
1401 to 1900	$512	$453	$1,550	$842	$3,357
1901 to 2400	$596	$526	$1,795	$978	$3,895
2401 to 2900	$663	$586	$1,995	$1,087	$4,331
2901 or more	$698	$617	$2,099	$1,144	$4,558
Nonresidential (per 1,000 square feet of building)					
Industrial	$95	$124	$748	$340	$1,307
Commercial	$704	$148	$1,074	$532	$2,458
Institutional	$254	$66	$472	$617	$1,409
Office & Other Services	$275	$258	$1,581	$806	$2,920

North Service Area - Alternative B	*Police Facilities*	*Fire Facilities*	*Street Facilities*	*Park and Recreational Facilities*	*TOTAL*
Residential (per housing unit by square feet of living space)					
900 or less	$245	$217	$406	$406	$1,274
901 to 1400	$403	$356	$659	$664	$2,082
1401 to 1900	$512	$453	$835	$842	$2,642
1901 to 2400	$596	$526	$968	$978	$3,068
2401 to 2900	$663	$586	$1,076	$1,087	$3,412
2901 or more	$698	$617	$1,133	$1,144	$3,592
Nonresidential (per 1,000 square feet of building)					
Industrial	$95	$124	$389	$340	$948
Commercial	$704	$148	$647	$532	$2,031
Institutional	$254	$66	$280	$617	$1,217
Office & Other Services	$275	$258	$837	$806	$2,176

South Service Area	*Police Facilities*	*Fire Facilities*	*Street Facilities*	*Park and Recreational Facilities*	*TOTAL*
Residential (per housing unit by square feet of living space)					
900 or less	$245	$217	$54	$280	$796
901 to 1400	$403	$356	$93	$461	$1,313
1401 to 1900	$512	$453	$120	$585	$1,670
1901 to 2400	$596	$526	$141	$681	$1,944
2401 to 2900	$663	$586	$158	$757	$2,164
2901 or more	$698	$617	$167	$797	$2,279
Nonresidential (per 1,000 square feet of building)					
Industrial	$95	$124	$33	$144	$396
Commercial	$704	$148	$222	$172	$1,246
Institutional	$254	$66	$89	$77	$486
Office & Other Services	$275	$258	$96	$300	$929

Figure 3 compares preliminary residential impact fees in Tempe (shaded light blue) to other jurisdictions in the Phoenix metropolitan area. For jurisdictions with multiple service areas, TischlerBise selected the geographic area most like Tempe. For example, East Glendale is also horizontally "built-out" but expecting redevelopment and infill projects. This area has less infrastructure needs and lower fees than the western area of Glendale.

In contrast to other jurisdictions that have separate fee amounts for single versus multifamily housing, the proposed fees in Tempe are for all types of housing by size range (measured in square feet of finished living space). To simplify the comparison table, only the average size fees are shown for North and South Tempe.

Figure 3: Comparison of Residential Fees to Other Jurisdictions

Ranked by Total per Single Dwelling

Jurisdiction	*Total*	*Parks*	*Fire*	*Police*	*Streets*	*Water**	*Wastewater***	*Other*
Chandler (average)	**$19,958**	$2,875	$412	$277	$3,901	$5,680	$6,642	$171
Avondale	**$17,707**	$796	$607	$499	$2,945	$4,651	$7,673	$536
Gilbert (north)	**$17,232**	$4,081	$1,235	$1,234	$450	$5,901	$3,176	$1,155
Queen Creek	**$15,890**	$3,681	$490	$167	$1,263	$4,014	$5,082	$1,193
Glendale (east)	**$8,650**	$909	$1,146	$339	$1,551	$2,761	$1,944	$0
Phoenix Ahwatukee	**$7,970**	$977	$372	$149	$1,834	$2,726	$1,729	$183
Peoria (south)	**$7,733**	$0	$417	$503	$0	$4,890	$1,923	$0
Mesa (debt service)	**$7,139**	$1,122	$272	$402	$0	$2,220	$2,659	$464
Tempe North Alternative A	**$6,355**	$842	$453	$512	$1,550	$1,664	$1,334	$0
Tempe North Alternative B	**$5,640**	$842	$453	$512	$835	$1,664	$1,334	$0
Scottsdale	**$5,407**	$0	$0	$0	$0	$3,365	$2,042	$0
Tempe South	**$4,942**	$681	$526	$596	$141	$1,664	$1,334	$0

** fee for smallest meter includes water resources*

*** fee for smallest meter includes reclaimed/reuse water*

Figure 4 provides a comparison of impact fees for industrial, commercial, and office development. Preliminary fees for Tempe are shaded light blue.

Figure 4: Comparison of Nonresidential Fees to Other Jurisdictions

Proposed Industrial Fees per 1,000 Square Feet of Floor Area						
Jurisdiction	*Total*	*Parks*	*Streets*	*Police*	*Fire*	*Other*
Chandler	**$2,490**	$0	$2,300	$70	$100	$20
Queen Creek	**$1,936**	$650	$429	$56	$335	$466
Gilbert	**$1,600**	$300	$470	$315	$315	$200
Phoenix Ahwatukee	**$1,597**	$78	$1,174	$73	$182	$90
Avondale	**$1,400**	$130	$1,000	$80	$100	$90
Tempe North Alternative A	**$1,307**	$340	$748	$95	$124	$0
Tempe North Alternative B	**$948**	$340	$389	$95	$124	$0
Mesa (only previous debt)	**$771**	$0	$0	$318	$215	$238
Glendale (east)	**$472**	$23	$308	$12	$129	$0
Tempe South of Baseline	**$396**	$144	$33	$95	$124	$0
Peoria (south)	**$106**	$0	$0	$58	$48	$0

Proposed Commercial Fees per 1,000 Square Feet of Floor Area						
Jurisdiction	*Total*	*Parks*	*Streets*	*Police*	*Fire*	*Other*
Avondale	**$6,160**	$820	$3,660	$510	$620	$550
Chandler	**$5,050**	$0	$4,130	$320	$480	$120
Phoenix Ahwatukee	**$3,330**	$137	$2,806	$82	$205	$101
Queen Creek	**$3,054**	$563	$1,569	$229	$290	$403
Gilbert	**$2,890**	$500	$1,080	$505	$505	$300
Glendale (east)	**$2,591**	$43	$2,210	$99	$239	$0
Tempe North Alternative A	**$2,458**	$532	$1,074	$704	$148	$0
Tempe North Alternative B	**$2,031**	$532	$647	$704	$148	$0
Tempe South of Baseline	**$1,248**	$174	$222	$704	$148	$0
Peoria (south)	**$1,011**	$0	$0	$553	$458	$0
Mesa (only previous debt)	**$771**	$0	$0	$318	$215	$238

Proposed Office Fees per 1,000 Square Feet of Floor Area						
Jurisdiction	*Total*	*Parks*	*Streets*	*Police*	*Fire*	*Other*
Chandler	**$4,970**	$0	$4,360	$210	$320	$80
Gilbert	**$2,940**	$700	$650	$595	$595	$400
Tempe North Alternative A	**$2,920**	$806	$1,581	$275	$258	$0
Phoenix Ahwatukee	**$2,470**	$101	$1,926	$94	$234	$115
Avondale	**$2,300**	$240	$1,580	$150	$180	$150
Tempe North Alternative B	**$2,176**	$806	$837	$275	$258	$0
Queen Creek	**$2,001**	$552	$679	$90	$285	$395
Glendale (east)	**$1,660**	$101	$957	$39	$563	$0
Tempe South of Baseline	**$929**	$300	$96	$275	$258	$0
Mesa (only previous debt)	**$771**	$0	$0	$318	$215	$238
Peoria (south)	**$313**	$0	$0	$171	$142	$0

POLICE FACILITIES IIP

ARS 9-463.05.T.7 (f) defines the police facilities eligible for development fee funding.

> *"Police facilities, including all appurtenances, equipment and vehicles. Police facilities do not include a facility or portion of a facility that is used to replace services that were once provided elsewhere in the municipality, vehicles and equipment used to provide administrative services, helicopters or airplanes or a facility that is used for training officers from more than one station or substation."*

The City of Tempe will use an incremental expansion cost methodology to maintain the current infrastructure standards for police buildings. Although police vehicles and equipment are eligible for impact fee funding, Tempe is taking a conservative approach by excluding these items due to uncertainty regarding expansion of the police force over the next five years.

Service Area for Police Facilities

To hasten response times, officers are dispersed throughout city and routinely patrol all developed areas. Tempe has one, citywide service area for police facilities.

Excluded Costs

Development fees in Tempe exclude costs to upgrade, update, improve, expand, correct or replace necessary public services to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards. The City's comprehensive Capital Improvement Plan (CIP) includes the cost of these excluded items.

Current Use and Available Capacity

Police facilities are fully utilized. Because there is no surplus capacity, future development will require additional police building space.

Proportionate Share for Police Facilities

ARS 9-463.05 (B)(3) states that the development fee shall not exceed a proportionate share of the cost of necessary public services needed to accommodate future development. TischlerBise recommends functional population to allocate the cost of additional police building space to residential and nonresidential development (see Figure P1). Functional population is similar to what the U.S. Census Bureau calls "daytime population," by accounting for people living and working in a jurisdiction. Residents that don't work are assigned 20 hours per day to residential development and four hours per day to nonresidential development (annualized averages). Residents that work in Tempe are assigned 14 hours to residential development and 10 hours to nonresidential development. Residents that work outside Tempe are assigned 14 hours to residential development. Inflow commuters are assigned 10 hours to nonresidential development. Based on 2011 functional population data for Tempe, the cost allocation for residential development is 56% while nonresidential development accounts for 44% of the demand for police facilities.

Figure P1: Functional Population

Functional Population Cost Allocation for Public Safety

		Demand Units in 2011		Demand Hours/Day	Person Hours
Residential					
	Population*	164,268			
58%	Residents Not Working	95,108		20	1,902,160
42%	Resident Workers**	69,160			
28%	Worked in City**		19,183	14	268,562
72%	Worked Outside City**		49,977	14	699,678
				Residential Subtotal	2,870,400
				Residential Share =>	**56%**
Nonresidential					
	Non-working Residents	95,108		4	380,432
	Jobs Located in City**	185,825			
10%	Residents Working in City**		19,183	10	191,830
90%	Non-Resident Workers (inflow commuters)		166,642	10	1,666,420
				Nonresidential Subtotal	2,238,682
				Nonresidential Share =>	**44%**
				TOTAL	5,109,082

** 2011 U.S. Census Bureau population estimate.*
*** 2011 Inflow/Outflow Analysis, OnTheMap web application, U.S. Census Bureau data for all jobs.*

Police Facilities, Service Units, and Standards

As specified in ARS 9-463.05.B.4 police development fees in Tempe are based on the same level of service provided to existing development. Figure P2 inventories police buildings in Tempe. For residential development, Tempe will use year-round population within the City to derive current police infrastructure standards. For nonresidential development, Tempe will use inbound, average-weekday, vehicle trips as the service unit. The lower portion of the table below indicates the allocation of police building space to residential and nonresidential development, along with 2014 service units in Tempe. Vehicle trips to nonresidential development are based on floor area estimates for four general types of development (industrial, commercial, institutional and office/other services), as documented in the Land Use Assumptions (see Appendix C). Also, trip generation rates are discussed further in the Streets Facilities IIP section of this document.

City staff provided a cost estimate of $383 per square foot for police buildings based on the insurance replacement cost of existing police buildings in Tempe. This cost factor is consistent with police building cost per square foot used in recent development fee studies for Peoria, Chandler, Goodyear, and Buckeye. Tempe has provided 0.52 square feet of police building for each City resident. To maintain the current infrastructure standard for police buildings, Tempe needs to spend $232 for each additional resident. For nonresidential development, Tempe has provided 0.16 square feet of police building per inbound vehicle trip to nonresidential development on an average weekday. To maintain the current

infrastructure standard, Tempe must spend $50 per additional vehicle trip to nonresidential development.

Figure P2: Tempe Police Buildings

Police Buildings	*Square Feet*
120 E. 5th St (Headquarters)	49,231
1855 E. Apache Blvd	80,276
8201 S. Hardy Dr (South Substation)	25,716
10 W. Guadalupe (only Kiwanis Substation)	3,100
TOTAL	158,323

Source: City of Tempe Police Department.

Police Building Standards

	Residential	*Nonresidential*
Proportionate Share	56%	44%
Growth Indicator	*Persons*	*Avg Wkdy Veh Trips to Nonres Dev*
Service Units in 2014	170,488	448,859
Square Feet per Service Unit	0.52	0.16
Cost per Service Unit*	$232	$50

** Based on cost estimate of $383 per square foot to construct and finish a new building.*

Development fees can be used to expand the fleet of police vehicles and purchase additional communications equipment that has a useful life of at least three years. Figure P3 lists police vehicles and equipment used by law enforcement officers in Tempe (excluding vehicles used for administrative services). In Tempe there are 899 vehicles and communications equipment items, with a capital cost of approximately $16.2 million, which is a weighted average cost of approximately $18,000 per item. To maintain the current infrastructure standard for police vehicles and equipment, each additional City resident will require an expenditure of $62, with each additional vehicle trip to nonresidential development requiring an expenditure of $13.

Figure P3: Tempe Police Vehicles and Equipment

Police Vehicles and Communications Equipment	*Count*	*Current Cost per Unit*	*Total*
Marked Vehicles	143	$50,700	$7,250,100
Unmarked Vehicles	149	$34,900	$5,200,100
Motorcycles	27	$25,000	$675,000
Portable Radios	580	$5,300	$3,074,000
TOTAL	899		$16,199,200
Weighted Average Cost per Unit =>		$18,000	

Source: City of Tempe Police Department.

Police Standards for Vehicles and Communications Equipment

	Residential	*Nonresidential*
Proportionate Share	56%	44%
Growth Indicator	*Persons*	*Avg Wkdy Veh Trips*
Service Units in 2014	170,488	448,859
Vehicles/Equipment per Service Unit	0.0030	0.0009
Cost per Service Unit	$62	$13

Police Infrastructure Needs Analysis

Arizona's development fee enabling legislation requires jurisdictions to convert land use assumptions in service units and the corresponding need for additional infrastructure over the next ten years. As shown in Figure P4, projected population and nonresidential vehicle trips drive the need for police buildings and vehicles. To maintain current standards, Tempe will need approximately 26,600 additional square feet of police buildings. The ten-year, growth-related capital cost of police buildings is approximately $10.2 million. The projected capital expenditure on additional police vehicles or communications equipment items is $2.7 million over the next ten years. However, the preliminary police development fees do not cover the cost of additional vehicles and equipment.

Figure P4: Police Facilities Needed to Accommodate Growth

Police Infrastructure Standards and Capital Costs

Police Buildings - Residential	0.52	Sq Ft per person
Police Buildings - Nonresidential	0.16	Sq Ft per trip
Police Building Cost	$383	per sq ft for new construction
Police Vehicles - Residential	0.0030	Veh/Equip per person
Police Vehicles - Nonresidential	0.0009	Veh/Equip per vehicle trip
Police Vehicles/Equipment Cost	$18,000	per item

				Infrastructure Needed	
	Year	*Tempe Population*	*Veh Trips to Nonres in Tempe*	*Police Buildings*	*Police Vehicles & Communications Equipment*
Base	2014	170,488	448,859	158,323	899
Year 1	2015	172,648	460,415	161,240	916
Year 2	2016	174,835	472,369	164,232	933
Year 3	2017	177,050	484,715	167,300	950
Year 4	2018	179,293	497,404	170,436	968
Year 5	2019	181,564	510,469	173,645	986
Year 6	2020	183,864	523,948	176,933	1,005
Year 7	2021	186,652	527,474	178,930	1,016
Year 8	2022	189,440	531,001	180,927	1,027
Year 9	2023	192,228	534,583	182,933	1,039
Year 10	2024	195,016	538,109	184,930	1,050
Ten-Yr Increase		24,528	89,250	26,607	151
			Growth Cost of Police Building =>	$10,190,000	
			Cost of Police Vehicles & Communications Equipment =>		$2,718,000
			Total Growth Cost for Police Facilities (rounded) =>		$12,908,000

Development Fees for Police Facilities

Infrastructure standards and cost factors for police are summarized in the upper portion of Figure P5. The conversion of infrastructure needs and costs per service unit into a cost per development unit is also shown in the table below. For residential development, average number of persons per housing unit provides the necessary conversion. For nonresidential development, trip generation rates by type of development are from the Institute of Transportation Engineers (ITE 2012). To ensure the analysis is based on travel demand associated with nonresidential development within Tempe, trip ends (entering and exiting) are converted to inbound trips using trip adjustment factors. For industrial and office/other services, a basic adjustment of 50% is applied. Because commercial and institutional development (like schools and daycare) attracts "pass-by" trips, the adjustment factor for commercial is only 33%, based on the average pass-by factor for shopping centers (ITE 2012). Preliminary development fees for police facilities are shown in the column with blue shading.

Figure P5: Police Service Units and Fees per Development Unit

	Cost per Person	*Cost per Inbound Trip*
Police Buildings	$232	$50
Police Vehicles & Equipment	$0	$0
IIP and Fee Study		
TOTAL	$232	$50

Residential (per housing unit)

Square Feet of Living Space	*Persons per Hsg Unit**	*Police Facilities Fees*
900 or less	1.06	$245
901 to 1400	1.74	$403
1401 to 1900	2.21	$512
1901 to 2400	2.57	$596
2401 to 2900	2.86	$663
2901 or more	3.01	$698

** see Figure C11 in Land Use Assumptions*

Nonresidential (per 1,000 square feet of building)

Type	*Avg Wkdy Veh Trip Ends***	*Trip Adjustment Factors****	*Police Facilities Fees*
Industrial	3.82	50%	$95
Commercial	42.70	33%	$704
Institutional	15.43	33%	$254
Office & Other Services	11.03	50%	$275

*** see Figure C5 in Land Use Assumptions*

**** Commercial and institutional includes pass-by adjustment.*

Forecast of Revenues for Police Facilities

Appendix A contains the forecast of revenues required by Arizona's enabling legislation. Figure P6 indicates Tempe should receive approximately $8.3 million in police development fee revenue, if actual development matches the land use assumptions documented in Appendix C. To the extent the rate of development either accelerates or slows down, there will be a corresponding change in the need for infrastructure and development fee revenue.

Development fee revenue is less than the projected growth cost of a new police building (i.e. approximately $10.2 million). The primary reason for the projected revenue shortfall is the assumption by Maricopa Association of Governments (MAG) that the percentage of vacant/seasonal units will decrease over time. In other words, projected population is expected to rise at a faster rate than the projected increase in housing units.

Figure P6: Projected Police Development Fee Revenue

Ten-Year Cost of Growth-Related Police Facilities

	Total CIP Cost	*Growth Cost*	*Other Cost*
Police Building =>	$20,800,000	$10,190,000	$10,610,000
Police Vehicles and Equipment =>	$0	$0	$0
	$20,800,000	$10,190,000	$10,610,000
	Share =>	49%	51%

Police Impact Fee Revenue

		Average-Size Residential	*Industrial*	*Commercial*	*Institutional*	*Office & Other Services*
		$512	$95	$704	$254	$275
		per housing unit	per 1000 Sq Ft	per 1000 Sq Ft	per 1000 Sq Ft	per 1000 Sq Ft
	Year	*Hsg Units*	*KSF*	*KSF*	*KSF*	*KSF*
Base	2014	74,785	29,610	12,710	16,300	23,610
Year 1	2015	75,191	29,830	12,940	16,800	24,580
Year 2	2016	75,599	30,060	13,170	17,320	25,600
Year 3	2017	76,010	30,280	13,410	17,850	26,660
Year 4	2018	76,423	30,510	13,650	18,400	27,760
Year 5	2019	76,838	30,740	13,890	18,970	28,910
Year 6	2020	77,255	30,970	14,140	19,550	30,100
Year 7	2021	78,525	30,970	14,150	19,890	30,400
Year 8	2022	79,795	30,970	14,160	20,230	30,700
Year 9	2023	81,065	30,970	14,170	20,570	31,010
Year 10	2024	82,335	30,970	14,180	20,910	31,310
Ten-Yr Increase		7,550	1,360	1,470	4,610	7,700
Projected Revenue =>		$3,866,000	$129,000	$1,035,000	$1,171,000	$2,118,000
					Total Projected Revenues (rounded) =>	$8,319,000

FIRE FACILITIES IIP

ARS 9-463.05.T.7 (f) defines the fire facilities eligible for development fee funding.

> *"Fire facilities, including all appurtenances, equipment and vehicles. Fire facilities do not include a facility or portion of a facility that is used to replace services that were once provided elsewhere in the municipality, vehicles and equipment used to provide administrative services, helicopters or airplanes or a facility that is used for training officers from more than one station or substation."*

The City of Tempe will use an incremental expansion cost methodology to maintain the current infrastructure standards for fire buildings, vehicles and communications equipment.

Service Area for Fire Facilities

To hasten response times, fire, medical and rescue response teams are dispatched from nearby stations, with multiple stations responding if warranted. Thus all developed areas within the City of Tempe are served by an integrated public safety system with a citywide service area.

Excluded Costs

Development fees in Tempe exclude costs to upgrade, update, improve, expand, correct or replace necessary public services to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards. The City's comprehensive Capital Improvement Plan (CIP) includes the cost of these excluded items.

Current Use and Available Capacity

Fire facilities are fully utilized and there is no surplus capacity for future development. The City is in the process of updating its fire/medical/rescue master plan. Preliminary results indicate a need for at least one additional station in North Tempe and the possible replacement of an existing station by two new fire stations in South Tempe.

Proportionate Share for Fire Facilities

ARS 9-463.05 (B)(3) states that the development fee shall not exceed a proportionate share of the cost of necessary public services needed to provide necessary public services to the development. City staff provided calls for service data for the past fiscal year, tabulated by responses to residential and nonresidential locations. Based on calls for service, the cost allocation for residential development is 65% while nonresidential development accounts for 35% of the demand for fire facilities.

Existing Fire Facilities

As specified in ARS 9-463.05.B.4 fire development fees in Tempe are based on the same level of service provided to existing development. Figure F1 inventories fire buildings in Tempe. The cost per square foot of fire station was provided by City staff, based on preliminary cost estimates for the new station in North Tempe, excluding land acquisition.

For residential development, Tempe will use the City's year-round population to derive current fire infrastructure standards. For nonresidential development, Tempe will use jobs as the service unit. Tempe has provided 0.20 square feet of fire building space for each person in the City. To maintain the current infrastructure standard for fire buildings, Tempe needs to spend $150 for each additional resident. For nonresidential development, Tempe has provided 0.10 square feet of fire building space

per job. To maintain the current infrastructure standard for fire buildings, Tempe must spend $50 for each additional job.

Figure F1: Tempe Fire Buildings

Fire Stations	*Square Feet*
Fire Station #1	10,597
Fire Station #2	6,385
Fire Station #3	8,300
Fire Station #4	5,000
Fire Station #5	5,734
Fire Station #6	17,662
TOTAL	53,678

Allocation Factors for Fire Stations

Cost per Square Foot (excludes land)	$632
Residential Share	65%
Nonresidential Share	35%
Population in 2014	170,488
Jobs in 2014	187,859

Infrastructure Standards for Fire Stations

	Square Feet	*Capital Cost*
Residential (per person)	0.20	$150
Nonresidential (per job)	0.10	$50

Development fees will be used to expand the fleet of fire vehicles and purchase additional equipment that has a useful life of at least three years. Figure F2 lists fire vehicles and equipment currently used by the Tempe Fire Department, excluding items used for administrative services like pickup trucks and cars. Tempe currently has 19 vehicles and communications equipment items, with a capital cost of approximately $12.6 million, yielding a weighted average cost of approximately $663,300 per item.

The total count of fire apparatus was allocated to residential and nonresidential development in Tempe. As shown below, every 10,000 persons will require Tempe to purchase 0.7 additional fire apparatus items. To maintain the current infrastructure standard for fire vehicles and equipment, each additional resident equates to a capital cost of $55. Every 10,000 jobs require 0.4 additional fire apparatus items. For nonresidential development, the fire vehicle and equipment capital cost is $18 per job.

Figure F2: Tempe Fire Vehicles and Equipment

Fire Apparatus and Communications	*Items*	*Unit Cost*	*Total Cost*
Engines	8	$550,000	$4,400,000
Aerial Ladder	2	$1,300,000	$2,600,000
Hazardous Materials Truck	2	$1,000,000	$2,000,000
Heavy Rescue	1	$1,100,000	$1,100,000
Communications Equipment*	1	$1,032,000	$1,032,000
Ladder Tender	2	$250,000	$500,000
Light & Air Support Truck	1	$400,000	$400,000
Technical Rescue Support	1	$495,000	$495,000
Command Vehicle	1	$75,000	$75,000
TOTAL	19		$12,602,000

** Radios, dispatch, and communications network.*

Allocation Factors for Fire Apparatus and Communications

Average Cost per Unit	$663,300
Residential Share	65%
Nonresidential Share	35%
Population in 2014	170,488
Jobs in 2014	187,859

Infrastructure Standards for Fire Apparatus and Communications

	Apparatus and Communications	*Capital Cost*
Residential (per person)	0.00007	$55
Nonresidential (per job)	0.00004	$18

Fire Facilities Service Units, Standards, and Needs

Arizona's development fee enabling legislation requires jurisdictions to convert land use assumptions into service units and the corresponding need for additional infrastructure over the next ten years. As shown in Figure F3, projected population and jobs drive the needs analysis for fire buildings and vehicles. To maintain current standards, Tempe will need 8,972 additional square feet of fire buildings, plus approximately 3 fire apparatus items. In combination, Tempe anticipates capital costs of approximately $7.78 million for growth-related fire infrastructure over the next ten years.

Figure F3: Fire Facilities Needed to Accommodate Growth

Fire/Medical/Rescue Infrastructure Standards and Capital Costs

Fire Stations - Residential	0.20	Sq Ft per person
Fire Stations - Nonresidential	0.10	Sq Ft per job
Fire Station Cost	$632	per square foot
Fire Apparatus/Communications - Residential	0.00007	items per person
Fire Apparatus/Communications - Nonres	0.00004	items per job
Fire Apparatus/Communications Cost	$663,300	per item

				Facilities Needed	
	Year	*Tempe Population*	*Tempe Jobs*	*Sq Ft of Fire Stations*	*Fire Apparatus and Communications*
Base	2014	170,488	187,859	53,678	19
Year 1	2015	172,648	192,969	54,631	19
Year 2	2016	174,835	198,259	55,608	20
Year 3	2017	177,050	203,736	56,609	20
Year 4	2018	179,293	209,408	57,635	20
Year 5	2019	181,564	215,283	58,687	21
Year 6	2020	183,864	221,367	59,766	21
Year 7	2021	186,652	222,869	60,487	21
Year 8	2022	189,440	224,371	61,208	22
Year 9	2023	192,228	225,873	61,929	22
Year 10	2024	195,016	227,375	62,650	22
Ten-Yr Increase		24,528	39,516	8,972	3
			Cost of Fire Stations =>	$5,670,000	
		Growth Share of FS#7 (approximately 10,000 Sq Ft) =>		89.7%	
			Cost of Fire Apparatus and Communications =>		$2,106,000
			Total Growth Cost =>		$7,776,000

Development Fees for Fire Facilities

Infrastructure standards and cost factors for fire facilities are summarized in the upper portion of Figure 4. The conversion of infrastructure needs and costs per service unit into a cost per development unit is also shown in the table below. For residential development, average number of persons per housing unit provides the necessary conversion. For nonresidential development, average jobs (per thousand square feet of floor area) are derived from trip generation rates by type of development, published by the Institute of Transportation Engineers (ITE 2012). Additional details on demographic multipliers and nonresidential prototypes are provided in Appendix C. Preliminary development fees for fire facilities are shown in the column with light orange shading.

Figure F4 – Fire Service Units and Fees per Development Unit

	Cost per Person	*Cost per Job*
Fire Stations	$150	$50
Fire Apparatus and Communications Equipment	$55	$18
IIP and Fee Study		
TOTAL	$205	$68

Residential (per housing unit)

Square Feet of Living Space	*Persons per Hsg Unit**	*Fire Facilities Fee*
900 or less	1.06	$217
901 to 1400	1.74	$356
1401 to 1900	2.21	$453
1901 to 2400	2.57	$526
2401 to 2900	2.86	$586
2901 or more	3.01	$617

** see Figure C11 in Land Use Assumptions*

Nonresidential (per 1,000 square feet of building)

Type	*Jobs per 1,000 Sq Ft***	*Fire Facilities Fee*
Industrial	1.83	$124
Commercial	2.18	$148
Institutional	0.98	$66
Office & Other Services	3.80	$258

*** Figure C5 in Land Use Assumptions*

Forecast of Revenues for Fire Facilities

Appendix A contains the forecast of revenues required by Arizona's enabling legislation. Figure F5 indicates Tempe should receive approximately $6.1 million in fire development fee revenue, if actual development matches the land use assumptions documented in Appendix C. To the extent the rate of development either accelerates or slows down, there will be a corresponding change in the need for infrastructure and development fee revenue.

Development fee revenue is less than the projected growth cost of a new fire station and associated apparatus (i.e. approximately $7.8 million). The primary reason for the projected revenue shortfall is the assumption by Maricopa Association of Governments (MAG) that the percentage of vacant/seasonal units will decrease over time. In other words, projected population is expected to rise at a faster rate than the projected increase in housing units.

Figure F5: Projected Fire Development Fee Revenue

Ten-Year Cost of Growth-Related Fire Facilities

Fire Stations =>	$5,670,000
Fire Apparatus =>	$2,106,000
	$7,776,000

Fire Development Fee Revenue

		Average-Size Residential	*Industrial*	*Commercial*	*Institutional*	*Office & Other Services*
		$453	$124	$148	$66	$258
	Year	per housing unit	per 1000 Sq Ft	per 1000 Sq Ft	per 1000 Sq Ft	per 1000 Sq Ft
		Hsg Units	*KSF*	*KSF*	*KSF*	*KSF*
Base	2014	74,785	29,610	12,710	16,300	23,610
Year 1	2015	75,191	29,830	12,940	16,800	24,580
Year 2	2016	75,599	30,060	13,170	17,320	25,600
Year 3	2017	76,010	30,280	13,410	17,850	26,660
Year 4	2018	76,423	30,510	13,650	18,400	27,760
Year 5	2019	76,838	30,740	13,890	18,970	28,910
Year 6	2020	77,255	30,970	14,140	19,550	30,100
Year 7	2021	78,525	30,970	14,150	19,890	30,400
Year 8	2022	79,795	30,970	14,160	20,230	30,700
Year 9	2023	81,065	30,970	14,170	20,570	31,010
Year 10	2024	82,335	30,970	14,180	20,910	31,310
Ten-Yr Increase		7,550	1,360	1,470	4,610	7,700
Projected Revenue =>		$3,420,000	$169,000	$218,000	$304,000	$1,987,000
					Total Projected Revenues (rounded) =>	$6,098,000

STREET FACILITIES IIP

According to ARS 9-463.05.T.7 (e), street facilities include, "arterial or collector streets or roads that have been designated on an officially adopted plan of the municipality, traffic signals and rights-of-way and improvements thereon." Tempe's Street Facilities IIP includes intersection improvements, Transportation Systems Management (TSM), bus pullouts and a proposed streetcar to be constructed within the rights-of-way of streets.

As Tempe redevelops and intensifies under-utilized parcels, significant projected development over the next ten years will require additional transportation capacity with the equivalent carrying capacity of 66 arterials lane miles (see Figure S4 and related text). Because Tempe is essentially "built-out" horizontally, any future construction of additional arterial lane miles would require significant and very expensive acquisition of existing residences and businesses. Rather than attempt to accommodate this travel demand via automobiles that average of 1-2 occupants, Tempe will construct a high-occupancy streetcar line to service the urban area of North Tempe. The proposed streetcar line will inter-connect with the existing light-rail line, numerous bus routes and multi-use paths. At an estimated cost of $176.6 million, streetcar improvements should be less expensive than constructing 66 arterial lane miles. Assuming a conservative cost factor $3.07 million per arterial lane mile, obtained from Chandler's recent development fee study, Tempe would need to spend $202.6 million to accommodate projected travel demand by means of additional lane-miles. Also, to make the existing arterial network more efficient, Tempe will improve intersections, add communication networks and signal controls, and construct bus pullouts to remove transit vehicles from traffic flow while loading and unloading passengers.

Service Area for Street Facilities

Tempe development fees for street facilities are derived using a plan-based approach, with a specific list of improvements to be constructed in the next ten years. A citywide service area is appropriate for intersection improvements, TSM and bus pullouts. The new streetcar will be located in the more urbanized area near downtown Tempe and the ASU campus. North Tempe is the service area for the streetcar component of the street facilities development fee.

Existing Street Facilities

Vehicles Miles of Travel (VMT) is calibrated to lane miles of arterials. According to City staff, there are approximately 447 lane miles of arterials in Tempe. A lane mile is a rectangular area that is one travel lane wide and one mile long. All local and collector streets are considered project-level improvements, not eligible for development fee credits or reimbursements. As documented by the travel demand model discussed below, the existing infrastructure standard in Tempe is 1.43 arterial lane miles per 10,000 VMT.

There are 51 improved arterial-arterial intersections (i.e. signalized or roundabouts) and 70 bus pullouts in Tempe. These improvements are used to document existing infrastructure standards in Tempe. Currently there are 0.16 improved intersections and 0.22 bus pullouts per 10,000 VMT.

Excluded Costs

Development fees in Tempe exclude costs to upgrade, update, improve, expand, correct or replace necessary public services to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards. The City's comprehensive Capital Improvement Plan (CIP) includes the cost of these excluded items.

Forecast of Service Units for Street Facilities

For intersection improvements, TSM, and bus pullouts, Tempe will use average weekday vehicle miles of travel as the service units to document existing infrastructure standards and allocate the cost of future improvements. TischlerBise created an aggregate travel model to convert citywide development units within Tempe to vehicle trips and vehicle-miles of travel. Figure S1 summarizes the input variables for the travel model. Trip generation rates, expressed as average weekday Vehicle Trip Ends (VTE), are from the Institute of Transportation Engineers (ITE). HU is an abbreviation for housing unit. KSF is an abbreviation for square feet of nonresidential floor area, expressed in thousands. Each input variable is described further below.

Figure S1: Input Variables for Travel Demand Model

	ITE Code	*Dev Type*	*Weekday VTE*	*Dev Unit*	*Trip Adj*	*Trip Length Wt Factor*
R1	210	0-1 Bdrm	3.47	HU	61%	1.21
R2	210	2 Bdrms	5.44	HU	61%	1.21
R3	210	3 Bdrms	7.23	HU	61%	1.21
R4	210	4+ Bdrms	9.40	HU	61%	1.21
NR1	140	Industrial	3.82	KSF	50%	0.73
NR2	820	Commercial	42.70	KSF	33%	0.66
NR3	520	Institutional	15.43	KSF	33%	0.73
NR4	710	Office & Other	11.03	KSF	50%	0.73
Avg Trip Length (miles)	4.59					
Capacity Per Lane	7,000					

For high-occupancy transit improvements, such as Tempe's proposed streetcar, a better cost-allocation methodology than VMT is to simply use persons and jobs located within the service area. The growth share of planned improvements to be funded by development fees could be as high as 23%, based on the increase in North Tempe population and jobs in the service area from 2014 to 2030 (see Figure S2). Proposed funding alternatives being considered by Tempe use more conservative growth shares of 11% for Alternative A and 6% for Alternative B. As discussed further in a recent Planning Advisory Service Memo by TischlerBise (see American Planning Association PAS Memo, Jan/Feb 2015), next-generation impact fees in urban areas should allocate high-occupancy transit costs to persons and jobs because the movement of people from their place of residence to their place of work is being accomplished by walking, biking and transit systems, instead of vehicles.

Figure S2: Cost Allocation for Streetcar Component of Street Facilities

Cost Allocation for Streetcar	*Proportionate Share Based on Functional Population*	*2014 to 2030 Increase*	***Alternative A*** *Cost per Additional Service Unit*	***Alternative B*** *Cost per Additional Service Unit*
North Tempe Population	56%	16,519	$678	$339
North Tempe Jobs	44%	22,499	$391	$195
North Tempe Population in 2030 =>		82,921		
North Tempe Jobs in 2030 =>		86,078		
Growth Share Based on Increase in Population and Jobs =>		23%		

		Alternative A		***Alternative B***
Alternative Growth Shares for Streetcar* =>	11%	$20,000,000	6%	$10,000,000
Other Local Funding Alternatives =>	1%	$2,600,000	7%	$12,600,000
Federal and Regional Funds =>	87%	$154,000,000	87%	$154,000,000
Total Cost of Streetcar =>		$176,600,000		$176,600,000

** Based on increase in population and jobs, growth share could be 23%.*

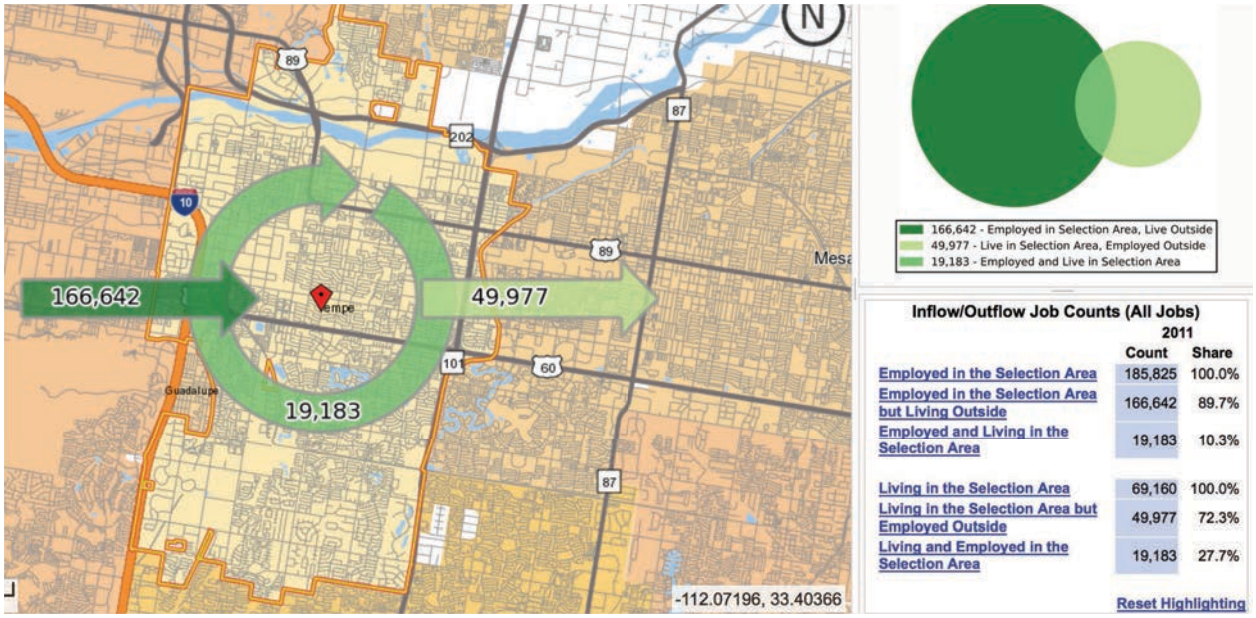
Trip Generation Rates

The vehicular components of the street facilities fee (i.e. intersection improvements, TSM, and bus pullouts) use average weekday vehicle trip ends from the reference book Trip Generation, published by the Institute of Transportation Engineers (ITE 2012). A vehicle trip end represents a vehicle either entering or exiting a development (as if a traffic counter were placed across a driveway). To calculate development fees for street facilities, trip generation rates require an adjustment factor to avoid double counting each trip at both the origin and destination points. The basic trip adjustment factor is 50%. As discussed further below, the fee methodology includes additional adjustments to make the fees proportionate the infrastructure demand for particular types of development.

Adjustments for Commuting Patterns and Pass-By Trips

Residential development has a larger trip adjustment factor of 61% to account for commuters leaving Tempe for work. In other words, residential development is assigned all inbound trips plus 11% of outbound trips to account for job locations outside of Tempe. According to Table 30 in the 2009 National Household Travel Survey, weekday work trips are typically 31% of production trips (i.e., all out-bound trips). As shown in Figure S3, the Census Bureau's web application OnTheMap indicates that approximately 72.3% of resident workers traveled outside the jurisdiction for work in 2011. In combination, these factors (0.31 x 0.50 x 0.723 = 0.11) support the additional 11% allocation of trips to residential development.

Figure S3: Inflow/Outflow Analysis



For commercial and institutional development, the trip adjustment factor is less than 50% because retail development and institutional uses, like schools and daycare, attract vehicles as they pass by on arterial streets. For example, when someone stops at a convenience store on the way home from work, the convenience store is not the primary destination. For an average shopping center, ITE data indicate 34% of the vehicles that enter are passing by on their way to some other primary destination. The remaining 66% of attraction trips have the commercial site as their primary destination. Because attraction trips are half of all trips, the trip adjustment factor is 66% multiplied by 50%, or approximately 33% of the trip ends.

Trip Length Weighting Factor by Type of Land Use

The street facilities fee methodology includes a percentage adjustment, or weighting factor, to account for trip length variation by type of land use. As documented in Table 6 of the 2009 National Household Travel Survey, vehicle trips from residential development are approximately 121% of the average trip length. The residential trip length adjustment factor includes data on home-based work trips, social, and recreational purposes. Conversely, shopping trips associated with commercial development are roughly 66% of the average trip length while other nonresidential development typically accounts for trips that are 73% of the average for all trips.

Lane Capacity

Street impact fees are based on an average daily lane capacity standard of 7,000 vehicles per lane, as recommended by City staff after reviewing traffic counts on arterial streets in Tempe. For example, Rural Road in north Tempe between Rio Salado Parkway and University Drive is extremely congested with the six lanes carrying in excess of 50,000 vehicles per day (8,300+ vehicles per lane). South of this segment, between University Drive and the US-60 freeway, Rural Road is less congested with the same six lanes carrying closer to 40,000 vehicles per day, which is approximately 6,700 vehicles per lane.

Travel Demand and Infrastructure Standards

The relationship between development in Tempe and the need for system improvements is shown in Figure S4. At the top of the table are data on development units in Tempe. The table includes annual calculations, but years 6-9 are hidden from view. Trip generation rates and trip adjustment factors convert projected development into average weekday vehicle trips, as shown in the middle section of the table. A typical vehicle trip, such as a person leaving their home and traveling to work, generally begins on a local street that connects to a collector street, which connects to an arterial road and eventually to a state or interstate highway. This progression of travel up and down the functional classification chain limits the average trip length determination, for the purpose of development fees, to the following question, "What is the average vehicle trip length on system improvements (i.e., arterial streets within Tempe)?"

With 447 lane miles of arterials in Tempe and a lane capacity standard of 7,000 vehicles per lane per day, the existing street network has 3,129,000 vehicle miles of capacity (i.e., 7,000 vehicles per lane over the entire 447 lane miles). To derive the average utilization (i.e., average trip length expressed in miles) of the arterial network, we divide vehicle miles of travel by vehicle trips attracted to development in Tempe. As shown below, development in Tempe currently attracts 752,230 average weekday vehicle trips. Dividing 3,129,000 vehicle miles of capacity by existing average weekday vehicle trips, yields an un-weighted average trip length of approximately 4.16 miles. However, the calibration of average trip length includes the same adjustment factors used in the development fee calculations (i.e., journey-to-work commuting, commercial and institutional pass-by adjustment, and average trip length adjustment by type of land use). With these refinements, the weighted-average trip length is 4.59 miles.

At the bottom of Figure S4 are Vehicle Miles of Travel (VMT), which is a measurement unit equal to one vehicle traveling one mile. In the aggregate, VMT is the product of vehicle trips multiplied by the average trip length. Typical VMT calculations for development-specific traffic studies, along with most transportation models of an entire urban area, are derived from traffic counts on particular road segments multiplied by the length of that road segment. For the purpose of development fees, VMT calculations are based on attraction (inbound) trips to development located in the service area, with the trip lengths calibrated to the road network considered to be system improvements (i.e. arterial streets). This refinement eliminates pass-through or external- external trips, and travel on roads that are not system improvements (e.g. limited access highways).

To maintain existing infrastructure standards for vehicular travel over the next ten years, Tempe would need an additional 66 lane miles of arterials, improvements to eight additional intersections, and the addition of 10 bus pullouts.

Figure S4: Ten-Year Travel Demand

Year->	*Base*	*1*	*2*	*3*	*4*	*5*	*10*	*Ten-Year*
Tempe Travel Demand Model	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2024*	*Increase*
0-1 Bdrm	13,006	13,077	13,148	13,219	13,291	13,363	14,319	1,313
2 Bdrms	18,301	18,401	18,501	18,601	18,702	18,804	20,149	1,848
3 Bdrms	25,826	25,967	26,108	26,249	26,392	26,535	28,434	2,608
4+ Bdrms	17,651	17,747	17,843	17,940	18,038	18,136	19,433	1,782
Industrial KSF	29,610	29,830	30,060	30,280	30,510	30,740	30,970	1,360
Commercial KSF	12,710	12,940	13,170	13,410	13,650	13,890	14,180	1,470
Institutional KSF	16,300	16,800	17,320	17,850	18,400	18,970	20,910	4,610
Office & Other Services KSF	23,610	24,580	25,600	26,660	27,760	28,910	31,310	7,700
0-1 Bdrm Trips	27,530	27,680	27,830	27,981	28,133	28,285	30,309	
2 Bdrms Trips	60,730	61,062	61,394	61,726	62,061	62,399	66,862	
3 Bdrms Trips	113,900	114,522	115,144	115,766	116,397	117,027	125,402	
4+ Bdrms Trips	101,211	101,761	102,312	102,868	103,430	103,992	111,429	
Industrial Trips	56,555	56,975	57,415	57,835	58,274	58,713	59,153	
Commercial Trips	179,097	182,338	185,578	188,960	192,342	195,724	199,810	
Institutional Trips	82,998	85,544	88,192	90,890	93,691	96,593	106,472	
Office & Other Services Trips	130,209	135,559	141,184	147,030	153,096	159,439	172,675	
Total Vehicle Trips	752,230	765,441	779,049	793,056	807,424	822,173	872,112	
Vehicle Miles of Travel (VMT)	3,131,340	3,178,210	3,226,410	3,275,913	3,326,673	3,378,715	3,593,862	462,522
LANE MILES	447	454	461	468	475	483	513	66
Improved Intersections	51	52	53	53	54	55	59	8
Bus Pullouts	70	71	72	73	74	76	80	10
							Growth Share Based on VMT Increase =>	13%

Planned Improvements for Street Facilities

Tempe staff recommends the growth-related improvements listed in Figure S5 for development fee funding over the next ten years. Even though the need for improvements is based on traffic studies and quantitative measures, like volume to capacity ratios, the "need" for improvements is more difficult to determine for streets than for utility systems. The key difference is that water and sewer utilities are closed systems, but a street network is an open system. The demand for street capacity can be influenced by development units outside the service area and by what is know as "triple convergence." In essence, this concept acknowledges that transportation capacity is consumed by drivers changing their time, route, and mode of travel, with the latter being more significant in urban areas. Also, "congestion" is a relative and more subjective term that is closely connected with a person's willingness to pay. Given this complexity, the IIP for street facilities, which determines the magnitude of the preliminary development fees, can be expanded or contracted until the perceived need for improvements balances the willingness to pay for infrastructure capacity through development fees.

If a developer is asked to construct a system improvement (i.e. a project on the list) as a condition of development approval, it will be necessary for Tempe to provide a site-specific credit or reimburse the developer from future fee collections. The City will continue to require project level improvements, such as turn lanes and signals for ingress/egress, plus improvements to adjacent arterials as needed to implement the City's Complete Streets policies.

As shown in Figure S5, the IIP for vehicular components includes nine projects with a total ten-year cost of $18.55 million and approximately $2.42 million to be funded by development fees. The weighted average growth share for vehicular components is 13%, requiring approximately $16.13 million from other revenue sources. The streetcar component of the IIP for street facilities includes two alternatives, both with a total ten-year cost of $176.6 million. Alternative A assumes $20 million to be funded by

development fees, which is a growth share of 11%, requiring approximately $156.6 million from other revenue sources. Alternative B assumes $10 million to be funded by development fees, which is a growth share of 6%, requiring approximately $166.6 million from other revenue sources.

Figure S5: Summary of Ten-Year IIP for Street Facilities

Vehicular Components of Street Facilities

#	Description	Total Cost	Growth Share*	Growth Cost
1	Construction of Bus Pullouts	$5,630,000	13%	$731,900
2	Rural Rd & University Dr Intersection Improvements	$5,610,000	11%	$610,000
3	Rural Rd & Southern Ave Intersection Improvements	$3,370,000	11%	$370,000
4	Light Rail Efficiency Improvement at University Dr	$575,000	13%	$74,750
5	Fiber Optic Installation: Rural Road North	$1,243,081	21%	$259,455
6	Fiber Optic Installation & ITS Improv: Elliot, Guadalupe and Warner	$565,798	32%	$182,465
7	East Valley Arterial Congestion Monitoring	$265,385	38%	$99,997
8	Fiber Optic Installation: Rural Road South	$960,028	8%	$72,639
9	Fiber Optic Installation and ITS Improv: Broadway/I-10 and Rio Salado/L101	$333,645	5%	$17,394
	Ten-Year Total for Vehicular Improvements	$18,552,937	13%	$2,418,600
	Other Revenue =>	$16,134,337		
	Other Revenue Share =>	87%		

** Determined by ten-year increase in VMT (13%) or remaining cost after deducting grants.*

Alternative A Streetcar Component of Street Facilities

10	Streetcar along Rio Salado Pkwy (Marina Heights to Mill Ave); downtown loop on Mill and Ash; south to Apache Blvd and east to Dorsey Lane	$176,600,000	11%	$20,000,000
	Other Revenue =>	$156,600,000		
	Other Revenue Share =>	89%		

Alternative B Streetcar Component of Street Facilities

10	Streetcar along Rio Salado Pkwy (Marina Heights to Mill Ave); downtown loop on Mill and Ash; south to Apache Blvd and east to Dorsey Lane	$176,600,000	6%	$10,000,000
	Other Revenue =>	$166,600,000		
	Other Revenue Share =>	94%		

Development Fees for Street Facilities

Figure S6 indicates the growth cost for the vehicular components and the increase in average weekday VMT over the next ten years. Inbound vehicle trips by type of development are multiplied by the capital cost per vehicle mile of travel to yield the development fees. Given the City's plan to fund $2,418,600 with development fees, and the projected increase of 462,522 vehicle miles of travel over the next ten years, the capital cost is $5.22 per VMT. To derive the development fee for commercial development per 1000 square feet of floor area, multiply the following factors from Figure S6.

42.70 weekday vehicle trip ends per 1000 square feet
x
0.33 adjustment factor for inbound trips, including pass-by
x
4.59 average miles per trip
x
0.66 trip length adjustment factor for commercial development
x
$5.22 growth cost per VMT
=
$222 per 1000 square feet (truncated)

The text below from Trip Generation (ITE 2012) supports the consultant's recommendation to use ITE 820 Shopping Center as a reasonable proxy for all commercial development. The shopping center trip generation rates are based on 302 studies with an r-squared value of 0.79. The latter is a goodness-of-fit indicator with values ranging from 0 to 1. Higher values indicate the independent variable (floor area) provides a better prediction of the dependent variable (average weekday vehicle trip ends). If the r-squared value is less than 0.50, ITE does not publish the value because factors other than floor area provide a better prediction of trip rates.

"A shopping center is an integrated group of commercial establishments. Shopping centers, including neighborhood, community, regional, and super regional centers, were surveyed for this land use. Some of these centers contained non-merchandising facilities, such as office buildings, movie theaters, restaurants, post offices, banks, and health clubs. Many shopping centers, in addition to the integrated unit of shops in one building or enclosed around a mall, include out parcels (peripheral buildings or pads located on the perimeter of the center adjacent to the streets and major access points). These buildings are typically drive-in banks, retail stores, restaurants, or small offices. Although the data herein do not indicate which of the centers studied include peripheral buildings, it can be assumed that some of the data show their effect."

Figure S6: Citywide Development Fee Schedule for Street Facilities

Input Variables

Average Miles per Trip	4.59
Growth Share of CIP	$2,418,600
VMT Increase Over Ten Years	462,522
Capital Cost per VMT	$5.22

Development Type	*Avg Wkdy Veh Trip Ends**	*Trip Rate Adjustment*	*Trip Length Adjustment*	*Citywide Street Facilities Fee*
Residential (per housing unit) by Square Feet of Living Space				
900 or less	3.07	61%	121%	**$54**
901 to 1400	5.30	61%	121%	**$93**
1401 to 1900	6.84	61%	121%	**$120**
1901 to 2400	8.02	61%	121%	**$141**
2401 to 2900	8.97	61%	121%	**$158**
2901 or more	9.47	61%	121%	**$167**
Nonresidential (per 1,000 Square Feet of Floor Area)				
Industrial	3.82	50%	73%	**$33**
Commercial	42.70	33%	66%	**$222**
Institutional	15.43	33%	73%	**$89**
Office and Other Services	11.03	50%	73%	**$96**

** Trip rates are from Tempe Land Use Assumptions*

see Figure C12 for residential and Figure C6 for nonresidential

Development fees for street facilities in North Tempe are shown in Figure S7. To derive the streetcar component of the street facilities fee for residential development, multiply the residential proportionate share factor (56%) by the growth cost of improvements divide by the increase in service units from 2014 to 2030 and multiply by the average number of persons per housing unit. For Alternative A, the fee for the smallest size dwelling unit is 0.56 * $20,000,000 / 16,519 * 1.04, or $705 per unit (truncated).

Figure S7: North Tempe Development Fee Schedule for Street Facilities

Cost Allocation for Streetcar

	Proportionate Share Based on Functional Population	*2014 to 2030 Increase*	*Alternative A Cost per Additional Service Unit*	*Alternative B Cost per Additional Service Unit*
North Tempe Population	56%	16,519	$678	$339
North Tempe Jobs	44%	22,499	$391	$195

		Alternative A		*Alternative B*
Alternative Growth Shares for Streetcar* =>	11%	$20,000,000	6%	$10,000,000
Other Local Funding Alternatives =>	1%	$2,600,000	7%	$12,600,000
Federal and Regional Funds =>	87%	$154,000,000	87%	$154,000,000
Total Cost of Streetcar =>		$176,600,000		$176,600,000

** Based on increase in population and jobs, growth share could be 23%.*

Residential (per housing unit)

Square Feet of Living Space	*Persons per Housing Unit***	*North Tempe Street Facilities Fee*	*North Tempe Street Facilities Fee*
900 or less	1.04	$705	$352
901 to 1400	1.67	$1,132	$566
1401 to 1900	2.11	$1,430	$715
1901 to 2400	2.44	$1,654	$827
2401 to 2900	2.71	$1,837	$918
2901 or more	2.85	$1,932	$966

*** see Figure C14 in Tempe Land Use Assumptions.*

Nonresidential (per 1,000 square feet of building)

Type	*Jobs per 1,000 Sq Ft****	*North Tempe Fee*	*North Tempe Fee*
Industrial	1.83	$715	$356
Commercial	2.18	$852	$425
Institutional	0.98	$383	$191
Office & Other Services	3.80	$1,485	$741

**** see Figure C5 in Tempe Land Use Assumptions.*

Forecast of Revenues for Street Facilities

Appendix A contains the forecast of revenues required by Arizona's enabling legislation. The revenue projections shown below assume development over the next ten years is consistent with the land use assumptions described in Appendix C. To the extent the rate of development either accelerates or slows down, there will be a corresponding change in the development fee revenue. As shown in Figure S8, the ten-year projection of citywide development fee revenue for street facilities ($2.4 million) matches the growth cost of improvements to be funded with development fees.

Figure S8: Projected Citywide Fee Revenue for Street Facilities

Ten-Year Growth Cost of Citywide Improvements => $2,418,600

Citywide Development Fee Revenue for Street Facilities

		Average-Size Residential	*Industrial*	*Commercial*	*Institutional*	*Office & Other Services*
		$120	$33	$222	$89	$96
	Year	per housing unit	per 1000 Sq Ft	per 1000 Sq Ft	per 1000 Sq Ft	per 1000 Sq Ft
		Hsg Units	*KSF*	*KSF*	*KSF*	*KSF*
Base	2014	74,785	29,610	12,710	16,300	23,610
Year 1	2015	75,191	29,830	12,940	16,800	24,580
Year 2	2016	75,599	30,060	13,170	17,320	25,600
Year 3	2017	76,010	30,280	13,410	17,850	26,660
Year 4	2018	76,423	30,510	13,650	18,400	27,760
Year 5	2019	76,838	30,740	13,890	18,970	28,910
Year 10	2024	82,335	30,970	14,180	20,910	31,310
Ten-Yr Increase		7,550	1,360	1,470	4,610	7,700
Projected Revenue =>		$906,000	$45,000	$326,000	$410,000	$739,000
					Total Projected Revenue over Ten Years (rounded) =>	$2,426,000

Figure S9 indicates projected revenue for street facilities from new development in North Tempe over the next 16 years. The upper table is based on Alternative A and the lower table is based on Alternative B.

Figure S9: Projected North Tempe Revenue for Street Facilities

16-Year Growth Cost of Streetcar =>		$20,000,000	***if Alternative A***			
North Tempe Development Fee Revenue						
		Average-Size Residential	*Industrial*	*Commercial*	*Institutional*	*Office & Other Services*
		$1,430	$715	$852	$383	$1,485
	Year	per housing unit	per 1000 Sq Ft	per 1000 Sq Ft	per 1000 Sq Ft	per 1000 Sq Ft
		Hsg Units	*KSF*	*KSF*	*KSF*	*KSF*
Base	2014	27,021	8,980	4,140	9,120	7,660
Year 1	2015	27,236	9,080	4,300	9,410	8,120
Year 2	2016	27,453	9,190	4,460	9,720	8,620
Year 3	2017	27,672	9,290	4,630	10,030	9,140
Year 4	2018	27,892	9,400	4,810	10,360	9,700
Year 5	2019	28,114	9,500	5,000	10,690	10,290
Year 16	2030	32,993	9,360	5,170	13,060	11,780
16-Yr Increase		5,972	380	1,030	3,940	4,120
Projected Revenue =>		$8,540,000	$272,000	$878,000	$1,509,000	$6,118,000
					Total Projected Revenues (rounded) =>	$17,317,000
16-Year Growth Cost of Streetcar =>		$10,000,000	***if Alternative B***			
North Tempe Development Fee Revenue						
		Average-Size Residential	*Industrial*	*Commercial*	*Institutional*	*Office & Other Services*
		$715	$356	$425	$191	$741
	Year	per housing unit	per 1000 Sq Ft	per 1000 Sq Ft	per 1000 Sq Ft	per 1000 Sq Ft
		Hsg Units	*KSF*	*KSF*	*KSF*	*KSF*
Base	2014	27,021	8,980	4,140	9,120	7,660
Year 1	2015	27,236	9,080	4,300	9,410	8,120
Year 2	2016	27,453	9,190	4,460	9,720	8,620
Year 3	2017	27,672	9,290	4,630	10,030	9,140
Year 4	2018	27,892	9,400	4,810	10,360	9,700
Year 5	2019	28,114	9,500	5,000	10,690	10,290
Year 16	2030	32,993	9,360	5,170	13,060	11,780
16-Yr Increase		5,972	380	1,030	3,940	4,120
Projected Revenue =>		$4,270,000	$135,000	$438,000	$753,000	$3,053,000
					Total Projected Revenues (rounded) =>	$8,649,000

PARK AND RECREATIONAL FACILITIES IIP

ARS 9-463.05.T.7 (G) defines the facilities and assets which can be included in the Park and Recreational Facilities IIP:

> *"Neighborhood parks and recreational facilities on real property up to thirty acres in area, or parks and recreational facilities larger than thirty acres if the facilities provide a direct benefit to the development. Park and recreational facilities do not include vehicles, equipment or that portion of any facility that is used for amusement parks, aquariums, aquatic centers, auditoriums, arenas, arts and cultural facilities, bandstand and orchestra facilities, bathhouses, boathouses, clubhouses, community centers greater than three thousand square feet in floor area, environmental education centers, equestrian facilities, golf course facilities, greenhouses, lakes, museums, theme parks, water reclamation or riparian areas, wetlands, zoo facilities or similar recreational facilities, but may include swimming pools."*

The infrastructure improvements plan includes components for additional park improvements, community centers and trails. Tempe will maintain existing infrastructure standards, using an incremental expansion cost method for all components.

Service Area for Park and Recreational Facilities

Park improvements and community centers have a citywide service area and benefit all residents and workers in Tempe. Multi-use paths to be funded with development fees are located in North Tempe. The service area for paths is North Tempe.

Excluded Costs

Development fees in Tempe exclude costs to upgrade, update, improve, expand, correct or replace necessary public services to meet existing needs and usage and stricter safety, efficiency, environmental or regulatory standards. The City's comprehensive Capital Improvement Plan (CIP) includes the cost of these excluded items.

Current Use and Available Capacity

Park and recreational facilities are fully utilized and there is no surplus capacity for future development. To maintain current infrastructure standards for park improvements, community centers, and multi-use paths, new development will require additional facilities.

Proportionate Share for Park and Recreational Facilities

ARS 9-463.05.B.3 requires development fees to not exceed a proportionate share of the cost of necessary public services needed to serve new development. As shown in Figure PR1, TischlerBise recommends daytime population as a reasonable indicator of the potential demand for park and recreational facilities, from both residential and nonresidential development. According to the U.S. Census Bureau web application OnTheMap, there were 166,642 inflow commuters traveling to Tempe for work in 2011. The proportionate share is based on cumulative impact days per year with the number of residents potentially impacting park and recreational facilities 365 days per year. Inflow commuters potentially impact park and recreational facilities 200 days per year, assuming 4 workdays per week multiplied by 50 weeks a year. For park and recreational facilities, 66% of the cost of future improvements will be funded by residential development and 34% by nonresidential development.

Figure PR1: Daytime Population

Daytime Population in 2011			*Cumulative Impact Days per Year*			*Cost Allocation for Parks, Trails, Community Centers, and Libraries*	
Jurisdiction	*Residents*	*Inflow Commuters**	*Residential***	*Nonresidential****	*Total*	*Residential*	*Nonresidential*
Tempe	164,268	153,530	59,957,820	30,706,005	90,663,825	66%	34%

** (total jobs less public sector jobs) multiplied by percentage of non-resident workers*

*** Days per Year = 365 200 *** 4 Days per Week x 50 Weeks per Year*

Existing Standards and Needs for Park and Recreational Facilities

As specified in ARS 9-463.05.B.4 development fees in Tempe are based on the same level of service provided to existing development. Figure PR2 inventories existing parks in Tempe that are similar to future parks that will be funded with development fees. Tempe will primarily make improvements to "Mini" and Neighborhood Parks. For park improvements, Tempe has spent an average of approximately $208,500 per acre. Although development fees will not be used to acquire additional land for parks, the current park acreage standard was used as a proxy to determine the need for future improvements.

Tempe used resident population and jobs (i.e. work locations in Tempe) to derive current infrastructure standards for park improvements. Tempe has provided 1.0 acre of Mini and Neighborhood Parks for every thousand residents (0.0009 acres per person) and 0.0004 acres for every job. To maintain current infrastructure standards for park improvements, Tempe needs to spend $228 for each additional resident and $68 for each additional job.

Arizona's development fee enabling legislation requires jurisdictions to convert land use assumptions into service units and the corresponding need for additional infrastructure over the next ten years. As shown below, projected population and jobs drives the needs analysis for park improvements. To maintain current standards, Tempe will need to improve 38 acres of parks over the next ten years. The ten-year, growth-related capital cost for park improvements is approximately $7.97 million.

Figure PR2: Existing Standards for Park Improvements and Projected Needs

*Existing Parks**	*Improved Acres*	
	Included	*Excluded*
Regional		780
Community		176
Neighborhood	220	
Mini	9	
Sportsfield Complexes		223
Total	229	1,179

** Table 1, Public Park Categories, Tempe General Plan 2040.*

Allocation Factors for Park Improvements

Improvements Cost per Acre	$208,500
Residential Proportionate Share	66%
Nonresidential Proportionate Share	34%
	2014
2014 Tempe MPA Population in Households	159,671
2014 Tempe MPA Jobs	187,859

Infrastructure Standards for Park Improvements

	Improved Acres	*Capital Cost*
Residential (per person)	0.0009	$228
Nonresidential (per job)	0.0004	$68

		Need for Citywide Park Improvements		
	Year	*Population*	*Tempe Jobs*	*Acres of Improved Parks*
Base	2014	159,671	187,859	229
Year 1	2015	161,668	192,969	233
Year 2	2016	163,690	198,259	237
Year 3	2017	165,737	203,736	241
Year 4	2018	167,809	209,408	246
Year 5	2019	169,908	215,283	250
Year 6	2020	172,033	221,367	255
Year 7	2021	174,698	222,869	258
Year 8	2022	177,363	224,371	261
Year 9	2023	180,028	225,873	264
Year 10	2024	182,693	227,375	267
Ten-Yr Increase		23,022	39,516	38
		Total Expenditures on Improvements =>		$7,965,000

Figure PR3 inventories existing community centers in Tempe. With five centers that provide 169,500 square feet of floor area, Tempe has provided 0.70 square feet of community centers for every resident and 0.31 square feet for every job. As shown in the table below, Tempe needs over 28,000 square feet of community centers to maintain its current standard. Yet Arizona's development fee legislation only allows 3,000 square feet to be funded with development fees. Tempe is considering a 4,600 community center to be located at McClintock Pool, within the next ten years. Growth cost to be funded by development fees will be limited to 65% of the total project cost if the community center at McClintock Pool is approved by City Council. A new 3,000 square feet community center at another location could be 100% funded by development fees.

Figure PR3 – Existing Standards for Community Centers and Projected Need

Existing Facilities	*Square Feet*
Escalante Community Center	35,000
Kiwanis Community Center	56,200
Pyle Adult Center	20,600
Westside Community Center	28,300
North Multi-Generational Center	29,400
TOTAL	169,500

Allocation Factors for Community Centers	
Cost per Square Foot	$433
Residential Proportionate Share	66%
Nonresidential Share	34%
2014 Tempe MPA Population in Households	159,671
2014 Tempe MPA Jobs	187,859

Infrastructure Standards and Future Needs

	Square Feet	*Capital Cost*
Residential (per person)	0.70	$37
Nonresidential (per job)	0.31	$11

		Citywide Need for Community Centers		
	Year	*Population in Households*	*Tempe Jobs*	*Square Feet*
Base	2014	159,671	187,859	169,500
Year 1	2015	161,668	192,969	172,467
Year 2	2016	163,690	198,259	175,506
Year 3	2017	165,737	203,736	178,621
Year 4	2018	167,809	209,408	181,813
Year 5	2019	169,908	215,283	185,085
Year 6	2020	172,033	221,367	188,440
Year 7	2021	174,698	222,869	190,768
Year 8	2022	177,363	224,371	193,096
Year 9	2023	180,028	225,873	195,424
Year 10	2024	182,693	227,375	197,752
Ten-Yr Increase		23,022	39,516	28,252
			Cost to Maintain Current Standards =>	$12,233,000
			Planned Sq Ft at McClintock Pool =>	4,600
			Maximum Sq Ft Funded by Development Fees =>	3,000
			Growth Share =>	65%
			Growth Cost to be Funded by Development Fees =>	$1,299,000

Figure PR4 inventories existing paths in Tempe and documents current infrastructure standards. Tempe has provided 0.43 linear feet of path per resident and 0.20 linear feet per job. Staff provided the trail cost factor of $233 per linear foot based on the recent construction cost of paths in Tempe. To maintain current infrastructure standards for multi-use paths, Tempe will spend $122 for each additional resident and $33 for each additional job.

As shown at the bottom of the table below, projected population and jobs in North Tempe drive the needs analysis for paths. To maintain current standards, Tempe will need 8,420 linear feet (1.6 miles) of paths over the next ten years. The ten-year, growth-related capital cost for paths is approximately $1.96 million.

Figure PR4: Standards for Multi-Use Paths and Projected Needs

Existing Citywide Infrastructure Standards for Paths

	2014	
Total Linear Feet (20.85 miles)	110,088	*Proportionate Share*
Citywide Population in Tempe	170,488	66%
Linear Feet per Person	0.43	
Citywide Jobs in Tempe	187,859	34%
Linear Feet per Job	0.20	

Cost Factors and Future Needs in North Tempe

Trail Cost	$233	per linear foot
Capital Cost per Person	$122	
Capital Cost per Job	$33	

		Paths Needed in North Tempe		
	Year	*North Tempe Population*	*North Tempe Jobs*	*Linear Feet of Paths*
Base	2014	66,402	63,579	40,967
Year 1	2015	67,460	66,179	41,936
Year 2	2016	68,534	68,913	42,938
Year 3	2017	69,626	71,787	43,976
Year 4	2018	70,735	74,809	45,051
Year 5	2019	71,862	77,989	46,165
Year 6	2020	73,007	81,334	47,319
Year 7	2021	73,998	81,809	47,836
Year 8	2022	74,989	82,284	48,353
Year 9	2023	75,980	82,759	48,870
Year 10	2024	76,971	83,234	49,387
	Ten-Yr Increase	10,569	19,655	8,420
			Miles over the next ten years =>	1.6
			Growth-Related Expenditure on Trails =>	$1,962,000

Development Fees for Park and Recreational Facilities

Infrastructure standards and cost factors for park and recreational facilities are summarized in the upper portion of Figure PR5. The conversion of infrastructure needs and costs per service unit into a cost per development unit is also shown in the table below. For residential development, average number of persons per housing unit provides the necessary conversion and jobs per 1,000 square feet of floor area provide the conversion for nonresidential development. Preliminary development fees for park and recreational facilities are shown in the columns with light green shading. The left side indicates citywide fees and the right side indicates the additional fee in North Tempe to cover the growth share of multi-use paths.

Figure PR5: Park and Recreational Service Units and Fees per Development Unit

Citywide Park Improvements and Community Centers

Fee Component	*Cost per Person*	*Cost per Job*
Park Improvements	$228	$68
Community Centers	$37	$11
Professional Services		
TOTAL	$265	$79
Residential (per housing unit by size range)		
Square Feet of Living Space	*Persons per Hsg Unit****	*Citywide Park & Recreational Facilities Fee*
900 or less	1.06	$280
901 to 1400	1.74	$461
1401 to 1900	2.21	$585
1901 to 2400	2.57	$681
2401 to 2900	2.86	$757
2901 or more	3.01	$797
Nonresidential (per 1,000 square feet of building)		
Type	*Jobs per 1,000 Sq Ft***	*Citywide Park & Recreational Facilities Fee*
Industrial	1.83	$144
Commercial	2.18	$172
Institutional	0.98	$77
Office & Other Services	3.80	$300
**** see Figure C11 in Tempe Land Use Assumptions*		
*** see Figure C5 in Tempe Land Use Assumptions*		

North Tempe Multi-Use Paths

Fee Component	*Cost per Person*	*Cost per Job*
Paths	$122	$33
Professional Services		
TOTAL	$122	$33
Residential (per housing unit by size range)		
Square Feet of Living Space	*Persons per Hsg Unit**	*North Tempe Park & Recreational Facilities Fee*
900 or less	1.04	$126
901 to 1400	1.67	$203
1401 to 1900	2.11	$257
1901 to 2400	2.44	$297
2401 to 2900	2.71	$330
2901 or more	2.85	$347
Nonresidential (per 1,000 square feet of building)		
Type	*Jobs per 1,000 Sq Ft***	*North Tempe Park & Recreational Facilities Fee*
Industrial	1.83	$60
Commercial	2.18	$71
Institutional	0.98	$32
Office & Other Service	3.80	$125
** see Figure C14 in Tempe Land Use Assumptions*		
*** see Figure C5 in Tempe Land Use Assumptions*		

Forecast of Revenues for Park and Recreational Facilities

Appendix A contains the forecast of revenues required by Arizona's enabling legislation. Figure PR6 projects impact fee revenue over the next ten years to be approximately $7.6 million from citywide development and $1.5 million from North Tempe development. To the extent the rate of development varies from the land use assumption in Appendix C, there will be a corresponding change in the need for infrastructure and development fee revenue.

The primary reason for the projected revenue shortfall is the assumption by Maricopa Association of Governments (MAG) that the percentage of vacant/seasonal units will decrease over time. In other words, projected population is expected to rise at a faster rate than the projected increase in housing units.

The total CIP cost for paths in North Tempe is based on construction of Highline Canal (Baseline Road to Knox Road $5,289,000) and the North-South Rail Spur (Knox Rd to Beach Park $412,000).

Figure PR6: Park and Recreational Development Fee Revenue

Ten-Year Citywide Growth Cost	Park Improvements	$7,965,000
	Community Centers	$1,299,000
	Total =>	$9,264,000

Citywide Development Fee Revenue

		Average-Size Residential	*Industrial*	*Commercial*	*Institutional*	*Office & Other Services*
		$585	$144	$172	$77	$300
	Year	per housing unit	per 1000 Sq Ft	per 1000 Sq Ft	per 1000 Sq Ft	per 1000 Sq Ft
		Hsg Units	*KSF*	*KSF*	*KSF*	*KSF*
Base	2014	74,785	29,610	12,710	16,300	23,610
Year 1	2015	75,191	29,830	12,940	16,800	24,580
Year 2	2016	75,599	30,060	13,170	17,320	25,600
Year 3	2017	76,010	30,280	13,410	17,850	26,660
Year 4	2018	76,423	30,510	13,650	18,400	27,760
Year 5	2019	76,838	30,740	13,890	18,970	28,910
Year 10	2024	82,335	30,970	14,180	20,910	31,310
	Ten-Yr Increase	7,550	1,360	1,470	4,610	7,700
	Projected Revenue =>	$4,417,000	$196,000	$253,000	$355,000	$2,310,000
					Total Projected Revenues (rounded) =>	$7,531,000

	Total CIP Cost	*Growth Cost*	*Other Cost*
Ten-Year Cost of Paths in North Tempe =>	$5,701,000	$1,962,000	$3,739,000
Share =>		34%	66%

North Tempe Development Fee Revenue

		Average-Size Residential	*Industrial*	*Commercial*	*Institutional*	*Office & Other Services*
		$257	$60	$71	$32	$125
	Year	per housing unit	per 1000 Sq Ft	per 1000 Sq Ft	per 1000 Sq Ft	per 1000 Sq Ft
		Hsg Units	*KSF*	*KSF*	*KSF*	*KSF*
Base	2014	27,021	8,980	4,140	9,120	7,660
Year 1	2015	27,236	9,080	4,300	9,410	8,120
Year 2	2016	27,453	9,190	4,460	9,720	8,620
Year 3	2017	27,672	9,290	4,630	10,030	9,140
Year 4	2018	27,892	9,400	4,810	10,360	9,700
Year 5	2019	28,114	9,500	5,000	10,690	10,290
Year 10	2024	30,202	9,510	5,180	11,850	11,260
	Ten-Yr Increase	3,181	530	1,040	2,730	3,600
	Projected Revenue =>	$818,000	$32,000	$74,000	$87,000	$450,000
					Total Projected Revenues (rounded) =>	$1,461,000

APPENDIX A: TEMPE REVENUES

ARS 9-463.05.E.7 requires "A forecast of revenues generated by new service units other than development fees, which shall include estimated state-shared revenue, highway users revenue, federal revenue, ad valorem property taxes, construction contracting or similar excise taxes and the capital recovery portion of utility fees attributable to development based on the approved land use assumptions, and a plan to include these contributions in determining the extent of the burden imposed by the development as required in subsection B, paragraph 12 of this section."

Revenue projections for Tempe are shown in Figure A1.

Figure A1: Revenue Projections

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ARS 9-463.05.B.12 requires "The municipality shall forecast the contribution to be made in the future in cash or by taxes, fees, assessments or other sources of revenue derived from the property owner towards the capital costs of the necessary public service covered by the development fee and shall include these contributions in determining the extent of the burden imposed by the development. Beginning August 1, 2014, for purposes of calculating the required offset to development fees pursuant to this subsection, if a municipality imposes a construction contracting or similar excise tax rate in excess of the percentage amount of the transaction privilege tax rate imposed on the majority of other transaction privilege tax classifications, the entire excess portion of the construction contracting or similar excise tax shall be treated as a contribution to the capital costs of necessary public services provided to development for which development fees are assessed, unless the excess portion was already taken into account for such purpose pursuant to this subsection."

The sections quoted above are difficult to interpret, resulting in a range of approaches by municipalities. For example, Section B.12 modifies and restricts the forecast of contributions to "revenue derived from the property owner." However, contractors paying the construction excise tax are not typically the long-term property owners.

In Tempe, the construction contracting tax rate is currently 1.8% and the general privilege tax rate is 1.8%. Because there is no "excess portion," proposed development fees in Tempe do not require an additional offset for construction sales tax revenue.

APPENDIX B: COST OF PROFESSIONAL SERVICES

As stated in Arizona's development fee enabling legislation, "a municipality may assess development fees to offset costs to the municipality associated with providing necessary public services to a development, including the costs of infrastructure, improvements, real property, engineering and architectural services, financing and professional services required for the preparation or revision of a development fee pursuant to this section, including the relevant portion of the infrastructure improvements plan" (see 9-463.05.A). Because development fees must be updated at least every five years, the cost of professional services is allocated to the projected increase in service units over five years. Qualified professionals must develop the IIP, using generally accepted engineering and planning practices. A qualified professional is defined as "a professional engineer, surveyor, financial analyst or planner providing services within the scope of the person's license, education or experience". Costs shown below include IIP preparation, the development fee study and required public meetings for the eight-month adoption process.

Figure B1: Cost of Professional Services

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APPENDIX C: LAND USE ASSUMPTIONS

Arizona's development fee enabling legislation for municipalities (ARS 9-463.05) requires land use assumptions, meaning "projections of changes in land uses, densities, intensities and population for a specified service area over a period of at least ten years and pursuant to the general plan of the municipality."

The Land Use Assumptions (LUA) for Police Facilities, Fire Facilities, Street Facilities, Park and Recreational Facilities were prepared using data from the City of Tempe General Plan 2040 and are consistent with the land use assumptions for the City's water and wastewater facilities.

Starting with population, housing unit, and job projections from Tempe's General Plan 2040, TischlerBise prepared additional documentation on persons per housing units by bedroom range, nonresidential floor area, jobs per 1,000 square feet of nonresidential floor area, average weekday vehicle trip generation rates, and average weekday vehicle miles of travel. These metrics are the "service units" required by Arizona's development fee enabling legislation (see ARS 9-463.05 E 4 and 5). Tempe-specific data used in the land use assumptions include U.S. Census Bureau 2010 counts of population and housing units, American Community Survey tables, Public Use Microdata Samples (PUMS), Maricopa County Assessor's parcel-level livable square feet, plus 2013 socioeconomic projections from Maricopa Association of Governments (MAG).

Although long-range projections are necessary for planning major capital projects, development fees must be updated at least every five years and the mandatory Infrastructure Improvement Plan (IIP) is limited to ten years. Infrastructure standards are calibrated using the latest available data and the first projection year is fiscal year 2015-16. In the City of Tempe the fiscal year begins on July 1st.

Summary of Growth Indicators

Key land use assumptions for the City of Tempe development fee study are population, housing unit, and employment projections adopted by MAG in June 2013 and used in the Tempe General Plan 2040. TischlerBise used 2010, 2020, and 2030 data for the Tempe Municipal Planning Area (MPA), deriving interim-year data using compound growth rates during the first decade and linear growth during the second decade. Compound growth curves yield more conservative short-range increases. MAG employment projections (i.e. jobs located within the Tempe MPA) were converted to nonresidential floor area, based on average square feet per job multipliers. Four nonresidential development prototypes are discussed further below (see Figure C5 and related text).

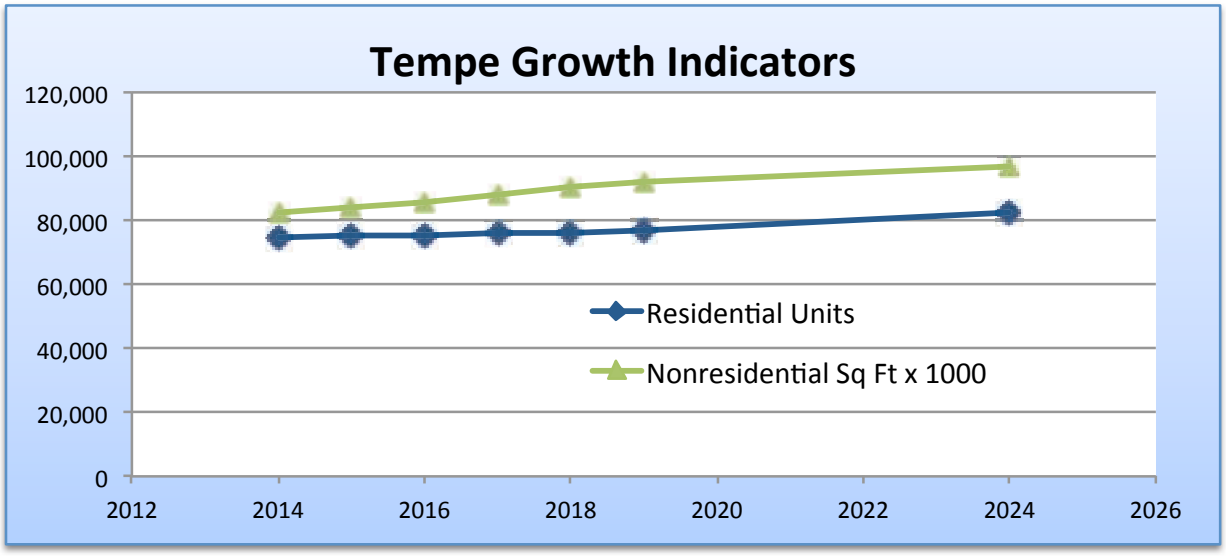
Development projections and growth rates are summarized in Figure C1. These projections will be used to estimate development fee revenue and to indicate the anticipated need for growth-related infrastructure. However, development fees methodologies are designed to reduce sensitivity to development projections in the determination of the proportionate-share fee amounts. If actual development is slower than projected, fee revenue will decline, but so will the need for growth-related infrastructure. In contrast, if development is faster than anticipated, the City will receive an increase in fee revenue, but will also need to accelerate infrastructure improvements to keep pace with the actual rate of development.

During the next five years, land use assumptions indicate an average increase of 411 housing units per year. Also, Tempe expects to add nonresidential floor area averaging approximately 2.06 million square feet per year.

Figure C1: Summary of Development Projections and Growth Rates

Tempe, Arizona

	Year							2014 to 2019 Average Annual	
	2014	*2015*	*2016*	*2017*	*2018*	*2019*	*2024*	*Increase*	*Compound Growth Rate*
Residential Units	74,785	75,191	75,599	76,010	76,423	76,838	82,335	411	0.54%
Nonresidential Sq Ft x 1000	82,230	84,150	86,150	88,200	90,320	92,510	97,370	2,056	2.38%



TischlerBise

Recent Residential Construction

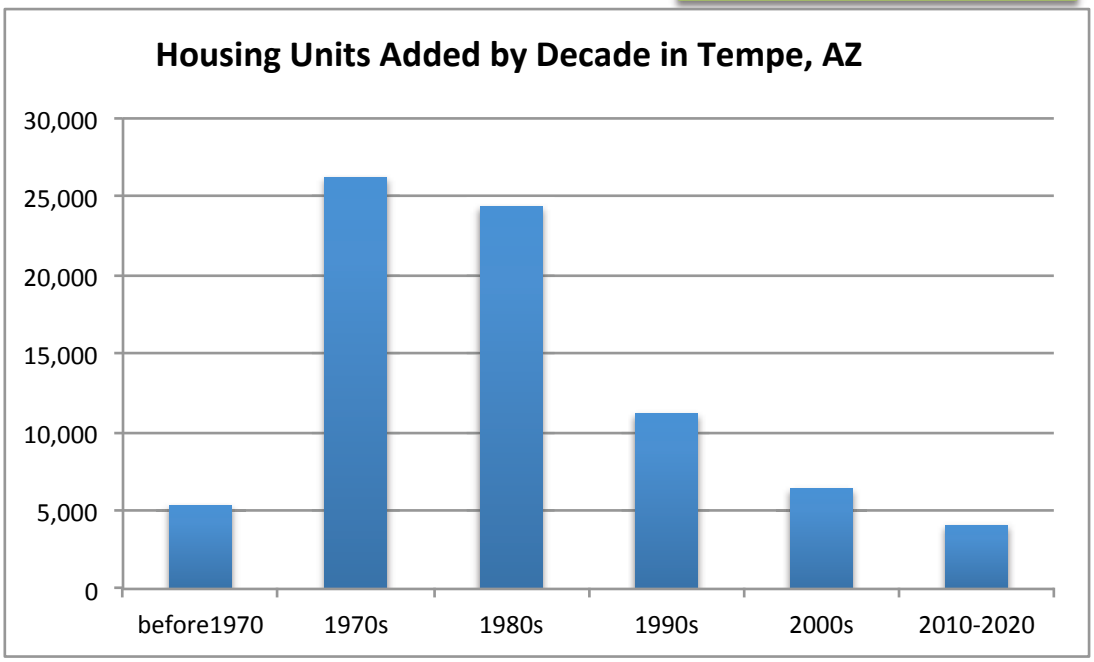
Since 2000, Tempe has increased by an average of 639 housing units per year. Figure C2 indicates the estimated number of housing units added by decade in Tempe. Consistent with the nationwide decline in development activity, residential construction slowed significantly since 2008, thus decreasing the number of units added during the past decade. From 2010 to 2020, Tempe expects to increase by 4,073 housing units.

Figure C2: Housing Units by Decade

Tempe, Arizona	
Census 2010 Population*	161,719
Census 2010 Housing Units*	73,462
Total Housing Units in 2000	67,068
New Housing Units 2000-2010	6,394

From 2000 to 2010, Tempe added an average of 639 housing units per year. The projected increase from 2010 to 2020 is an average of 407 housing units per year.

** U.S. Census Bureau SF1.*



Source for 1990s and earlier is Table B25034, American Community Survey, 2010, adjusted to yield total units in 2000. Projected units from 2010 to 2020 for Tempe MPA (MAG Socioeconomic Projections June 2013).

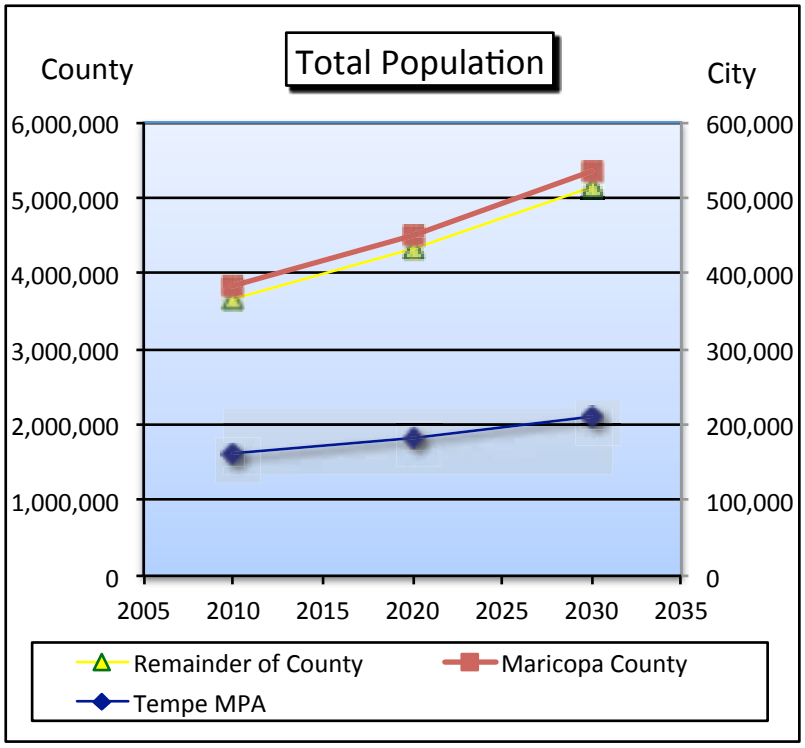
Population and Jobs Forecast

To provide context for population and job growth in Tempe, TischlerBise prepared comparisons to Maricopa County projections, published by MAG (June 2013). As shown in Figure C3, Tempe's share of countywide population declines slightly over time.

Figure C3: City of Tempe Population Share

	2010	2020	2030
Maricopa County	3,823,900	4,507,300	5,359,400
Tempe MPA	162,100	183,900	211,700
Remainder of County	3,661,800	4,323,400	5,147,700
City Share	4.2%	4.1%	4.0%

Source: Municipal Planning Area projections from Maricopa Association of Governments, June 2013.

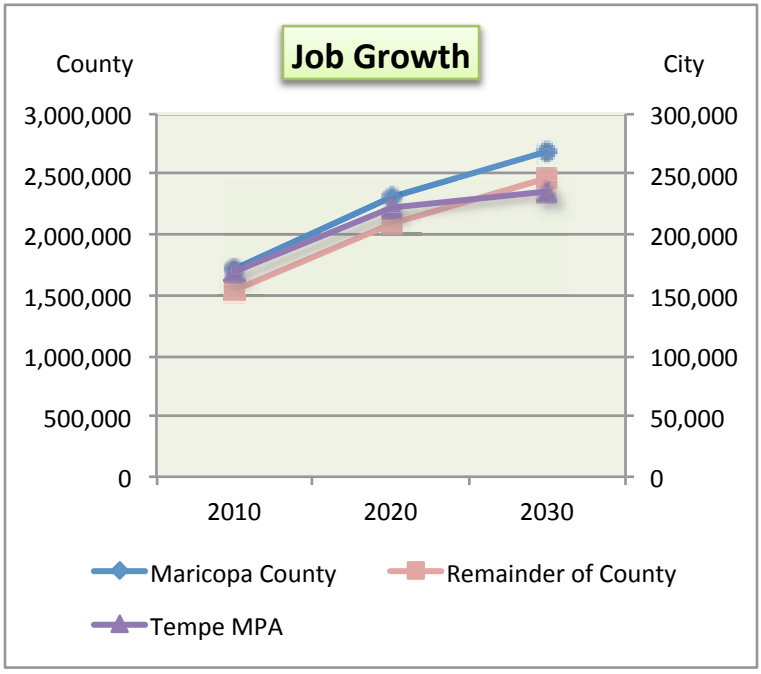


In addition to data on residential development, infrastructure improvement plans and fees calculations require data on nonresidential development. TischlerBise uses the term "jobs" to refer to employment by place of work. Similar to the population share evaluation discussed above, countywide jobs are shown in Figure C4 along with the City of Tempe job share. Tempe's job share declines slightly from 2010 to 2020, with a more dramatic decrease from 2020 to 2030.

Figure C4: City of Tempe Job Share

	2010	*2020*	*2030*
Maricopa County	1,706,300	2,312,900	2,696,900
Tempe MPA	169,100	221,400	236,400
Remainder of County	1,537,200	2,091,500	2,460,500
City Share	9.9%	9.6%	8.8%

Source: Municipal Planning Area projections from Maricopa Association of Governments, June 2013.



Jobs by Type of Nonresidential Development

Figure C5 indicates 2013 estimates of jobs and nonresidential floor area located in Tempe. Community Development staff provided current floor area estimates for industrial, commercial and office/other development, using Co-Star databases. For institutional development, such as pubic buildings, schools and churches, floor area in Tempe is based on public sector jobs and an average of 1,018 square feet per job. The prototype for institutional development is an elementary school (see Trip Generation, Institute of Transportation Engineers, 2012). For future industrial development, manufacturing (ITE code 140) is a reasonable proxy. In Tempe, industrial jobs average 545 square feet per job. The prototype for future commercial development is an average size shopping center (ITE code 820). Commercial development (i.e. retail and eating/drinking places) averages 458 square feet per job in Tempe. For office and other services, a general office (ITE 710) is the prototype for future development, with an average of 263 square feet per job in Tempe.

Figure C5: Jobs and Floor Area Estimates

	2013 Jobs (1)		*Sq Ft per Job*	*2013 Floor Area (2)*	*Jobs per 1000 Sq Ft*
Industrial (3)	53,925	29%	545	29,395,949	1.83
Commercial (4)	27,255	15%	458	12,492,678	2.18
Institutional (5)	15,535	8%	1,018	15,814,000	0.98
Office & Other (6)	86,209	47%	263	22,679,277	3.80
TOTAL	182,924	100%	439	80,381,904	2.28

(1) Jobs in 2013 based on MAG socioeconomic projections (June 2013) for 2010 and 2020.
(2) CoStar data, except Institutional that was estimated from the number of jobs. Office & Other includes "flex" space.
(3) MAG industrial.
(4) MAG retail.
(5) MAG public. The average of 1,018 square feet per job is derived from data in Trip Generation, published by the Institute of Transportation Engineers, 2012.
(6) MAG office and other.

Trip Generation Rates for Nonresidential Development

In Figure C6, gray shading indicates the four nonresidential development prototypes the will be used by TischlerBise to derive average weekday vehicle trips and Vehicle Miles of Travel (VMT). Trip generation rates are from the Institute of Transportation Engineers (ITE 2012).

Figure C6: Average Weekday Vehicle Trip Ends

ITE Code	*Land Use / Size*	*Demand Unit*	*Wkdy Trip Ends Per Dmd Unit**	*Wkdy Trip Ends Per Employee**	*Emp Per Dmd Unit*	*Sq Ft Per Emp*
110	Light Industrial	1,000 Sq Ft	6.97	3.02	2.31	433
130	Industrial Park	1,000 Sq Ft	6.83	3.34	2.04	489
140	Manufacturing	1,000 Sq Ft	3.82	2.13	1.79	558
150	Warehousing	1,000 Sq Ft	3.56	3.89	0.92	1,093
254	Assisted Living	bed	2.66	3.93	0.68	na
320	Motel	room	5.63	12.81	0.44	na
520	Elementary School	1,000 Sq Ft	15.43	15.71	0.98	1,018
530	High School	1,000 Sq Ft	12.89	19.74	0.65	1,531
540	Community College	student	1.23	15.55	0.08	na
550	University/College	student	1.71	8.96	0.19	na
565	Day Care	student	4.38	26.73	0.16	na
610	Hospital	1,000 Sq Ft	13.22	4.50	2.94	340
620	Nursing Home	1,000 Sq Ft	7.60	3.26	2.33	429
710	General Office (avg size)	1,000 Sq Ft	11.03	3.32	3.32	301
760	Research & Dev Center	1,000 Sq Ft	8.11	2.77	2.93	342
770	Business Park	1,000 Sq Ft	12.44	4.04	3.08	325
820	Shopping Center (avg size)	1,000 Sq Ft	42.70	na	2.00	500

* *Trip Generation, Institute of Transportation Engineers, 9th Edition (2012).*

Detailed Land Use Assumptions

Demographic data shown in Figure C7 are key inputs for Tempe's IIP and development fees. Cumulative data are shown at the top and projected annual increases, by type of development, are shown at the bottom of the table. Given the expectation that development fees are updated every three to five years, TischlerBise did not evaluate long-term demographic trends such as declining household size. As discussed in the next section, TischlerBise recommends the use of persons per housing unit to derive development fees. Therefore, vacancy rates and number of households are not essential land use assumptions.

As indicated by the increasing jobs-housing ratio, Tempe will remain a strong employment center, with the major increase in nonresidential floor area projected for office and other services. In contrast, the percentage of industrial jobs is projected to decline over time.

Figure C7: Annual Demographic Data

Tempe, Arizona		*FY14-15*	*FY15-16*	*FY16-17*	*FY17-18*	*FY18-19*	*FY19-20*	*FY20-21*	*FY24-25*
8/28/14	*2010*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2024*
		Base Yr	*1*	*2*	*3*	*4*	*5*	*6*	*10*
Total Population									
Tempe MPA	162,116	170,488	172,648	174,835	177,050	179,293	181,564	183,864	195,016
Population in Households									
Tempe MPA	151,927	159,671	161,668	163,690	165,737	167,809	169,908	172,033	182,693
Dwelling Units									
Tempe MPA	73,182	74,785	75,191	75,599	76,010	76,423	76,838	77,255	82,335
Persons per Hsg Unit	2.22	2.28	2.30	2.31	2.33	2.35	2.36	2.38	2.37
Jobs in Tempe MPA									
Industrial	52,725	54,331	54,740	55,152	55,567	55,985	56,406	56,831	56,831
Commercial	25,835	27,746	28,246	28,754	29,272	29,799	30,335	30,881	30,965
Institutional	14,185	16,013	16,505	17,013	17,536	18,076	18,632	19,205	20,541
Office & Other	76,350	89,770	93,479	97,340	101,362	105,549	109,909	114,450	119,038
Total Jobs	169,095	187,859	192,969	198,259	203,736	209,408	215,283	221,367	227,375
Jobs to Housing Ratio	2.31	2.51	2.57	2.62	2.68	2.74	2.80	2.87	2.76
Tempe MPA Nonresidential Floor Area (square feet in thousands)									
Industrial		29,610	29,830	30,060	30,280	30,510	30,740	30,970	30,970
Commercial		12,710	12,940	13,170	13,410	13,650	13,890	14,140	14,180
Institutional		16,300	16,800	17,320	17,850	18,400	18,970	19,550	20,910
Office & Other		23,610	24,580	25,600	26,660	27,760	28,910	30,100	31,310
Total KSF		82,230	84,150	86,150	88,200	90,320	92,510	94,760	97,370
Avg Sq Ft Per Job		438	436	435	433	431	430	428	428
Avg Jobs per KSF		2.28	2.29	2.30	2.31	2.32	2.33	2.34	2.34
									2014-2024
Annual Increase		7/14-7/15	7/15-7/16	7/16-7/17	7/17-7/18	7/18-7/19	7/19-7/20	7/20-7/21	***Avg Anl***
Total Population		2,160	2,187	2,215	2,243	2,271	2,300	2,788	2,174
Dwelling Units		406	408	411	413	415	417	1,270	755
Jobs		5,110	5,290	5,477	5,672	5,874	6,084	1,502	3,952
Industrial KSF		220	230	220	230	230	230	0	136
Commercial KSF		230	230	240	240	240	250	10	147
Institutional KSF		500	520	530	550	570	580	340	461
Office & Other KSF		970	1,020	1,060	1,100	1,150	1,190	300	770
Total Nonres KSF/Yr =>		1,920	2,000	2,050	2,120	2,190	2,250	650	1,514

Persons per Housing Unit

The 2010 census did not obtain detailed information using a "long-form" questionnaire. Instead, the U.S. Census Bureau has switched to a continuous monthly mailing of surveys, known as the American Community Survey (ACS), which is limited by sample-size constraints. For example, data on detached housing units are now combined with attached single units (commonly known as townhouses). Part of the rationale for deriving fees by bedroom range, as discussed further below, is to address this ACS data limitation. Because townhouses and mobile homes generally have fewer bedrooms than detached units, fees by bedroom range ensure proportionality and facilitate construction of affordable units.

According to the U.S. Census Bureau, a household is a housing unit that is occupied by year-round residents. Development fees often use per capita standards and persons per housing unit, or persons per household, to derive proportionate-share fee amounts. TischlerBise recommends that fees for residential development in the City of Tempe be imposed according to the number of year-round residents per housing unit. As shown Figure C8, the U.S. Census Bureau estimates Tempe had 72,744 housing units in 2012. Dwellings with a single unit per structure (detached, attached, and mobile homes) averaged 2.55 persons per housing unit. Dwellings in structures with multiple units averaged 1.73 year-round residents per unit. The overall average is 2.15 year-round residents per housing unit. To yield the total 2012 population estimate of 166,862, residents in group-quarters, such as the Arizona State University dorms, are added to residents in housing units.

Figure C8: Year-Round Persons per Unit by Type of Housing

2012 Summary by Type of Housing

Units in Structure	*Persons*	*House-holds*	*Persons per Household*	*Housing Units*	***Persons per Housing Unit***
Single Unit[1]	95,472	34,736	2.75	37,414	2.55
2+ Units	60,971	29,670	2.05	35,330	1.73
Subtotal	156,443	64,406	2.43	72,744	2.15
Group Quarters	10,419				
TOTAL	166,862				2.29

Source: U.S. Census Bureau, 2012 American Community Survey, 1-Year Estimates, Tables B25024, B25032, B25033, and B26001.
[1] Single unit includes detached, attached, and mobile homes.

Customized Trip Generation Rates per Housing Unit

As an alternative to simply using the national average trip generation rate for residential development, the Institute of Transportation Engineers (ITE) publishes regression curve formulas that may be used to derive custom trip generation rates, using local demographic data. Key independent variables needed for the analysis (i.e. vehicles available, housing units, households and persons) are available from American Community Survey data for Tempe. Customized average weekday trip generation rates by type of housing are shown in Figure C9. A vehicle trip end represents a vehicle either entering or exiting a development, as if a traffic counter were placed across a driveway. The custom trip generation rates for Tempe are lower than national averages. For example, single-unit residential development in Tempe is expected to produce 7.99 average weekday vehicle trip ends per dwelling, which is lower than the national average of 9.57.

Figure C9: Residential Trip Generation Rates by Type of Housing

Tempe, Arizona

	Vehicles Available (1)	*Households (2)* *Single Unit per Structure*	*2+ Units per Structure*	*Total*	*Vehicles per Household by Tenure*
Owner-occupied	52,224	26,026	1,568	27,594	1.89
Renter-occupied	48,431	8,710	28,102	36,812	1.32
TOTAL	100,655	34,736	29,670	64,406	1.56
Housing Units (6) =>		37,414	35,330	72,744	

Units per Structure	*Persons (3)*	*Trip Ends (4)*	*Vehicles by Type of Housing*	*Trip Ends (5)*	*Average Trip Ends*	*Trip Ends per Housing Unit*
Single Units	95,472	247,050	60,716	350,969	299,010	7.99
2+ Units	60,971	211,505	39,939	157,655	184,580	5.22
TOTAL	156,443	458,555	100,655	508,624	483,589	**6.65**

(1) Vehicles available by tenure from Table B25046, American Community Survey, 2012.
(2) Households by tenure and units in structure from Table B25032, American Community Survey, 2012.
(3) Persons by units in structure from Table B25033, American Community Survey, 2012.
(4) Vehicle trips ends based on persons using formulas from Trip Generation (ITE 2012). For single unit housing (ITE 210), the fitted curve equation is EXP(0.91*LN(persons)+1.52). To approximate the average population of the ITE studies, persons were divided by 171 and the equation result multiplied by 171. For 2+ unit housing (ITE 220), the fitted curve equation is (3.47*persons)-64.48.
(5) Vehicle trip ends based on vehicles available using formulas from Trip Generation (ITE 2012). For single unit housing (ITE 210), the fitted curve equation is EXP(0.99*LN(vehicles)+1.81). To approximate the average number of vehicles in the ITE studies, vehicles available were divided by 236 and the equation result multiplied by 236. For 2+ unit housing (ITE 220), the fitted curve equation is (3.94*vehicles)+293.58.
(6) Housing units from Table B25024, American Community Survey, 2012.

Demand Indicators by Dwelling Size

Development fees must be proportionate to the demand for infrastructure. Because averages per dwelling unit, for both persons and vehicle trips, have a strong, positive correlation to the number of bedrooms, TischlerBise recommends residential fee schedules that increase by dwelling size. Custom tabulations of demographic data by bedroom range can be created from individual survey responses provided by the U.S. Census Bureau, in files known as Public Use Microdata Samples (PUMS). PUMS files are only available for areas of at least 100,000 persons, with the City of Tempe in two 2010 Public Use Microdata Areas (AZ PUMA 108 and 109). Because Baseline Road is the boundary between the two areas, all parcels with frontage on Baseline Road would pay the lower impact fee.

As shown in Figure C10, TischlerBise derived trip generation rates and average persons per housing unit by bedroom range, from un-weighted PUMS data. The recommended citywide multipliers by bedroom range (shown below) are for all types of housing units.

Figure C10: Citywide Vehicle Trip Ends and Persons by Bedroom Range

Tempe, Arizona

Bedrooms	*Persons (1)*	*Trip Ends (2)*	*Vehicles Available (1)*	*Trip Ends (3)*	*Average Trip Ends*	*Housing Units (1)*	*Recommended Multipliers (4)* *Trip Ends per Housing Unit*	*Persons per Housing Unit*	*Housing Mix*
0-1	157	503	106	628	565	140	3.47	1.13	17%
2	372	1,102	236	1,388	1,245	197	5.44	1.90	24%
3	631	1,783	495	2,889	2,336	278	7.23	2.28	35%
4+	564	1,610	435	2,542	2,076	190	9.40	2.98	24%
Total	1,724	4,997	1,272	7,447	6,222	805	6.65	2.15	100%

(1) American Community Survey, Public Use Microdata Sample for AZ 2010 PUMAs 108 & 109 (2012 1-yr unweighted data).
(2) Vehicle trips ends based on persons using formulas from Trip Generation (ITE 2012). For single unit housing (ITE 210), the fitted curve equation is EXP(0.91*LN(persons)+1.52). To approximate the average population in the ITE studies, persons were divided by 3 and the equation result multiplied by 3.
(3) Vehicle trip ends based on vehicles available using formulas from Trip Generation (ITE 2012). For single unit housing (ITE 210), the fitted curve equation is EXP(0.99*LN(vehicles)+1.81). To approximate the average number of vehicles in the ITE studies, vehicles available were divided by 5 and the equation result multiplied by 5.
(4) Recommended trip ends are scaled to make the average derived from PUMS data match the weighted average trip generation rate for Tempe (see Figure A9).

Average floor area and number of persons by bedroom range are plotted in Figure C11, with a logarithmic trend line derived from four actual averages for Tempe. Using the trend line formula shown in the chart, TischlerBise derived the estimated average number of persons, by dwelling size, using 500 square feet intervals. For the purpose of development fees, TischlerBise recommends a minimum development fee based on a unit size of 900 square feet and a maximum fee for units 2,901 square feet or larger.

Using parcel-level data for existing residential units in Tempe, from the Maricopa Assessor's Office, TischlerBise derived average livable square feet by four size ranges. To determine these averages, residential units were grouped by standard deviations from the Tempe mean of 1,791 livable square feet (see following table).

Size Description	*Bedroom Range*	*Standard Deviation Range*	*Average Square Feet of Living Space in Tempe*
Small	0-1	Less than or equal to -1	957
Medium (North Tempe)	2	-0.999 to 0	1,470
Medium (citywide)	3	0 to +0.999	2,081
Large	4+	Greater than or equal to +1	3,104

As shown in the upper-right of Figure C11, the lowest floor area range (900 square feet or less) has an estimated average of 1.06 persons. This is consistent with U.S. Census Bureau summary statistics, for multifamily housing units constructed in 2013 in the West Census Region, indicating that 47% of multifamily units were either efficiencies or one-bedroom units suitable for a single-person household.

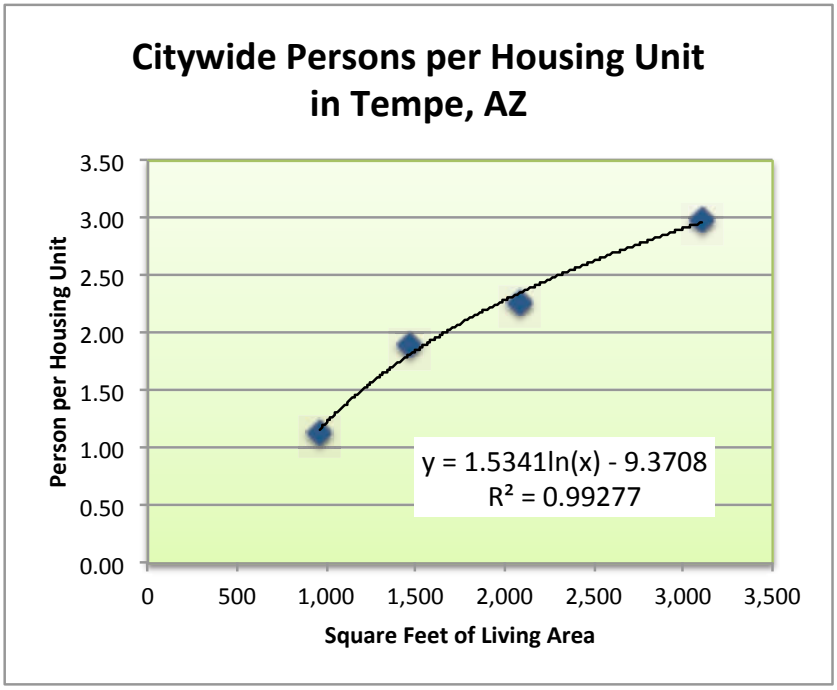
The average size of medium and large units in Tempe closely match the U.S. Census Bureau's Survey of Construction microdata for Mountain West states. For example, all two-bedroom single-family housing units (both detached and attached) constructed in 2013 had an average size of 1,744 square feet of finished living space. This same source indicates an average of 2,115 and 3,283 square feet of finished living space for three and four-or-more bedroom housing units, respectively.

Additional confirmation of unit sizes was obtained from a database of "residential entitlements" provided by Tempe planning staff. For development applications submitted from the last half of 2010 through the first half of 2014, new multifamily units range from 699 to 1,877 square feet, with an average size of 1,263 square feet. Based on the size of "entitled" multifamily units, these units are expected to average 1.06 to 2.21 persons per housing unit, as shown in the upper-right corner of Figure C11. The residential entitlements database also indicates new townhomes in Tempe range from 1,311 to 2,367 square feet. Based on the size of "entitled" townhomes, these units are expected to average 1.74 to 2.57 persons per housing unit.

Figure C11: Citywide Persons by Square Feet of Living Space

Actual Averages per Hsg Unit		
Bedrooms	*Square Feet*	*Persons*
0-1	957	1.13
2	1,470	1.90
3	2,081	2.28
4+	3,104	2.98

Fitted-Curve Values	
Sq Ft Range	*Persons*
900 or less	1.06
901 to 1400	1.74
1401 to 1900	2.21
1901 to 2400	2.57
2401 to 2900	2.86
2901 or more	3.01



Average persons per housing unit are derived from 2012 ACS PUMS data for North Tempe. Average livable square feet of dwellings was derived from Maricopa County Assessor's Office records, using residential parcels in Tempe.

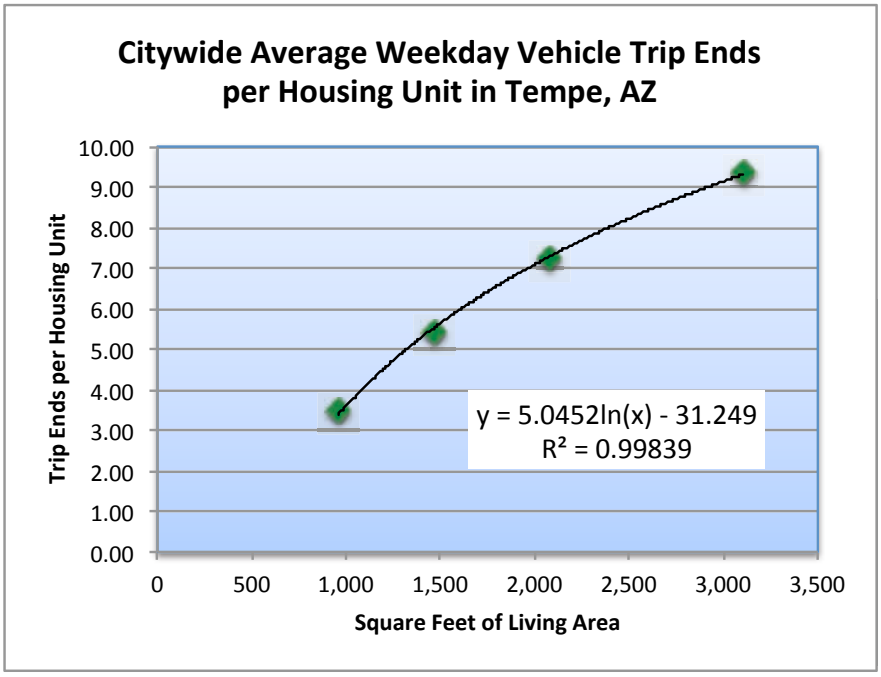
To derive average weekday vehicle trip ends by house size, TischlerBise combined demographic data derived from U.S. Census Bureau PUMS files with floor area data from the Maricopa County Assessor and a residential entitlements database provided by Tempe staff, as discussed above. Citywide average floor area and weekday vehicle trip ends, by bedroom range, are plotted in Figure C12, with a logarithmic trend line derived from four actual averages in Tempe. TischlerBise used the trend line formula to derive estimated trip ends by housing unit size, in 500 square feet intervals.

A medium-size residential unit in Tempe with approximately 1,900 square feet has a fitted-curve value of 6.84 vehicle trip ends on an average weekday. A small unit of 900 square feet or less would pay 45% of the transportation impact fee paid by a medium-size unit. A large unit of 2,901 square feet or more would pay 138% of the transportation impact fee paid by a medium-size unit. If Tempe implements a "one-size-fits-all" approach, small units will be required to pay more than their proportionate share

while large units will pay less than their proportionate share. An average fee that does not vary by size makes small units less affordable and essentially subsidizes larger units.

Figure C12: Citywide Vehicle Trips by Dwelling Size

Actual Averages per Hsg Unit			*Fitted-Curve Values*	
Bedrooms	*Square Feet*	*Trip Ends*	*Sq Ft Range*	*Trip Ends*
0-1	957	3.47	900 or less	3.07
2	1,470	5.44	901 to 1400	5.30
3	2,081	7.23	1401 to 1900	6.84
4+	3,104	9.40	1901 to 2400	8.02
			2401 to 2900	8.97
			2901 or more	9.47



Average weekday vehicles trip ends per housing unit are based on 2012 ACS PUMS data for Tempe. Average livable square feet of dwellings was derived from Maricopa County Assessor's Office records, using residential parcels in Tempe.

As shown in Figure C13, TischlerBise also derived average persons per housing unit by bedroom range in North Tempe, with Baseline Road as the boundary between north and south Tempe. The recommended multipliers by bedroom range, for all types of housing units, indicate fewer persons per housing unit and a higher percentage of smaller units in North Tempe.

Figure C13: Persons by Bedroom Range in North Tempe

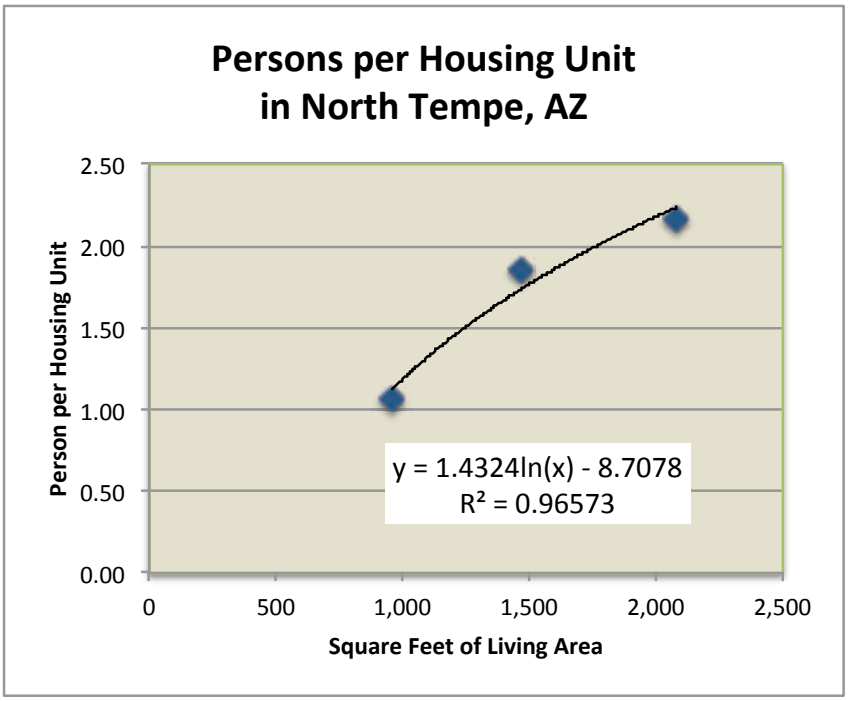
Bedrooms	*Persons**	*Housing Units**	*Persons per Housing Unit*	*Housing Mix*
0-1	107	100	1.07	26.5%
2	214	115	1.86	30.4%
3	239	110	2.17	29.1%
4+	170	53	**	14.0%
Total	730	378	1.93	100.0%

** American Community Survey, Public Use Microdata Sample for AZ 2010 PUMA 109 (2012 1-yr unweighted data).*
*** Excluded due to small sample size.*

Figure C14 documents the trend line formula used to estimate average number of persons by dwelling size in North Tempe. Given North Tempe's unique housing mix and lower number of persons per dwelling for each size threshold, TischlerBise recommends the multipliers shown below. For ease of administration, development fees in North Tempe will use the same square feet ranges as the citywide development fees.

Figure C14: Persons by Square Feet of Living Space in North Tempe

Actual Averages per Hsg Unit			*Fitted-Curve Values*	
Bedrooms	*Square Feet*	*Persons*	*Sq Ft Range*	*Persons*
0-1	957	1.07	900 or less	1.04
2	1,470	1.86	901 to 1400	1.67
3	2,081	2.17	1401 to 1900	2.11
4+		*	1901 to 2400	2.44
			2401 to 2900	2.71
			2901 or more	2.85

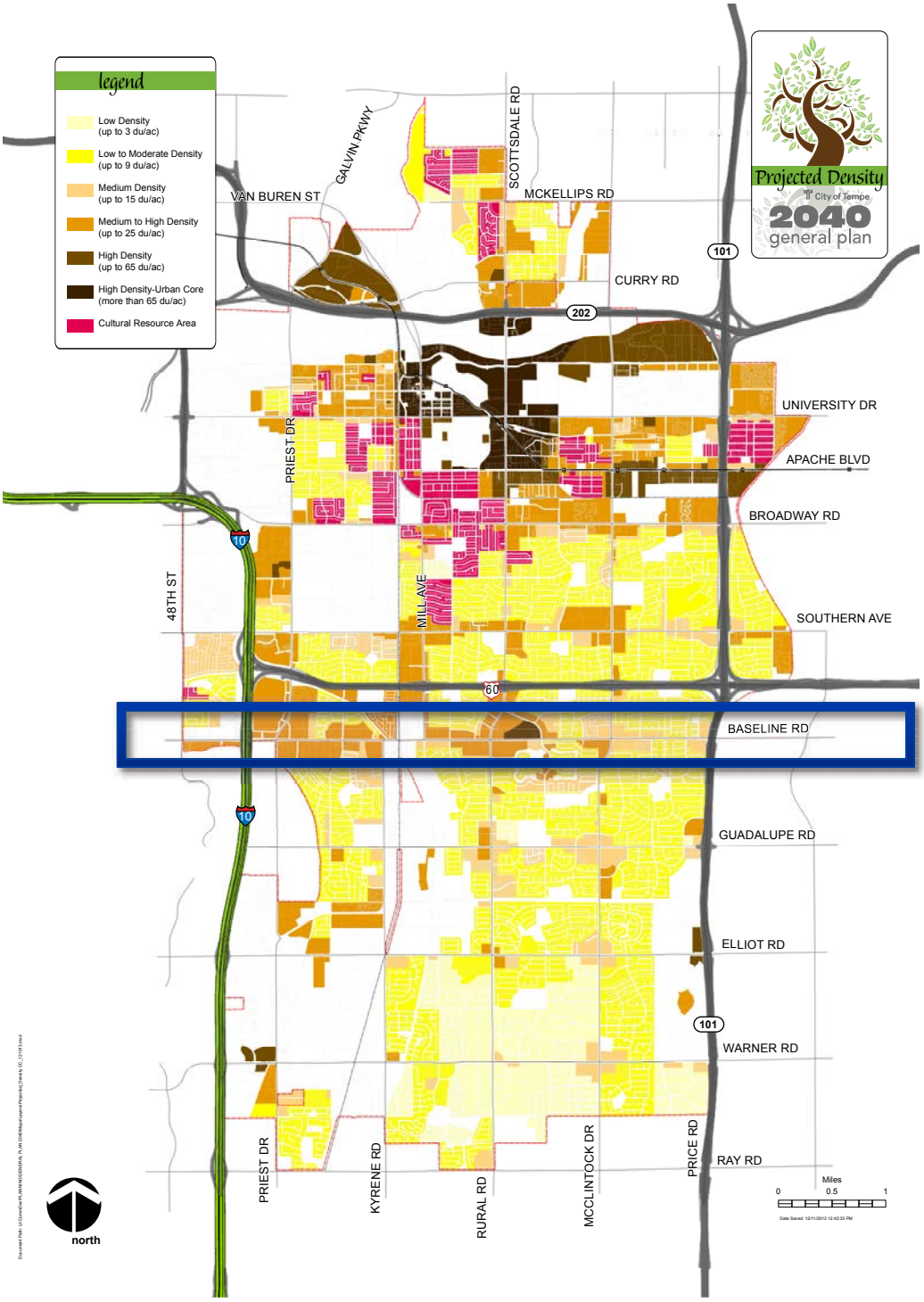


Average persons per housing unit are derived from 2012 ACS PUMS data for North Tempe. Average livable square feet of dwellings was derived from Maricopa County Assessor's Office records, using residential parcels in Tempe.

** Not used due to insufficient sample size in North Tempe.*

As shown in the map below, most high density/intensity development is expected north of Baseline Road (highlighted by blue rectangle). Also, Baseline delineates the north Public Use Microdata Area that provided demographic data for the land use assumptions. For parcels with frontage on Baseline, the lower fee will be imposed on both sides of the street.

Figure C15: Map of Tempe Service Areas



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